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OUR ANNUS MIRABILIS.*

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In 1667—exactly two and a third centuries ago—John Dryden was a young aspirant for the laurel wreath. Like many another Englishman of that day, he had changed sides at the Restoration, and since then he had been rather anxiously awaiting the arrival of some fit occasion for celebrating the greatness and goodness of his new master, Charles II. Since Charles was what he was, the fit occasion was slow in coming; and, rather than wait too long, the young poet was fain to content himself with a series of notable occurrences clustering about the year just past, 1666,—disasters though most of them were,—and to couple with his account of them such fulsome flattery of the king as the gross taste of the time permitted and encouraged.

The first in this series of occurrences, and perhaps the most memorable of them all, was the Great Plague of London. The disease was, alas, no new one. From the sixth century on it had moved westward over Europe, like a resistless rising tide, advancing and retreating in a series of tremendous waves, each gaining on its predecessors, until high tide was reached in that awful visitation which in the fourteenth century swept Great Britain, destroying, as is believed, from one-third to one-half of the entire population of the

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island. The deadly tide now ebbed. England, the utmost coast on which its waves could break, was reached less and less frequently, and with less and less violence. But almost the very last wave to reach her shores was a decuman wave, which in 1665 spent its force upon the capital. This visitation was not nearly so widespread, nor in its aggregate so deadly, as that of three hundred years before; yet it was awful enough to have o'erfreighted Dryden's ode with woe, had he included it in his scheme. Fortunately then for his immediate purpose, as well as for England, the plague had pretty well burned itself out in the year preceding the one he chose specially to commemorate, and there was no need to include it. Thus it was left for De Foe, some sixty years later, to take advantage of the interest and terror inspired by the next approaching wave of the plague, and to exploit in genuine modern fashion the greatest portent of all this series. His famous *Journal of the Plague Year*, though written by one who could have had no personal memory of the events, has all the vividness and convincing reality of the testimony of an eye-witness—which indeed it purports to be, and for which it has been repeatedly mistaken.

The next event, and the one upon which Dryden put his chief effort, as lending itself best to panegyric of England and of her new rulers, was the war with the Dutch. The naval battles, indeed, which he celebrates, though most stubbornly fought out on both sides, were inconclusive. Neither the palm of bravery nor of energy nor of skill can be confidently awarded to the one rather than to the other. Nor was the immediate advantage overwhelmingly on England's side. But it was a strenuous passage at arms, in which the king, his brother, and his cousin, Prince Rupert, had borne themselves not unworthily; and that was foundation enough for fulsome panegyric and for depreciating in regular John Bull fashion the equally high spirit of the foe. What gave the matter its real significance and whatever valid title it had to a place in the *Annus Mirabilis*, was something other

than all this, was something which neither Dryden nor Charles could have really understood:—that this was the second act in that long struggle which Englishmen were to wage with their kinsmen and neighbors for commercial empire;—not merely, as at that moment, in the narrow seas which separated their home-lands, but in America, in India, and in the islands of the sea. Its beginning was the famous Navigation Act of Oliver Cromwell; and its last scene—if indeed it be the last—is now enacting under our eyes in South Africa. But of this more anon.»

The Great Fire of London, Dryden's other portent, was spectacular indeed, and tremendous enough to those who witnessed it. But in the summing up of England's affairs, we see now that it was of no appreciable weight or importance; and even as regards the city itself, it was of lasting good rather than harm. It destroyed the noisome seed-beds of the plague, and made possible a more sanitary rebuilding, to which, no doubt, London largely owed her subsequent immunity.

Such were the wonders of Dryden's wonderful year—wonders spectacular merely, of no far-reaching importance whether in the physical realm or in the moral, at least so far as he or his times discerned them. One matter of really great moment had come, as we have seen, a little too early to fall within the limits of his year, and moreover had failed to lend itself to his immediate purpose. And, shortly after Dryden's poem appeared, another event occurred, not at all with observation, but of importance greater far than any of these—transcending even all else which happened in Charles' reign—the appearance of the *Paradise Lost*. It was too late for Dryden; and had it been in time, it would have lent itself still less than the Great Plague to the flatterer's use. Better probably than any other man of that time Dryden could have guessed somewhat of its real power and import as an immortal work of art. But even he could not have foreseen how strongly the thought of that blind poet was to shape the imagination and the convictions of

generations of men; how Milton's imagery should become the almost inevitable imagery in which men of our race must clothe their thought of that existence and of those realms and powers that lie beyond the veil. Thus strangely do realities, as we are pleased to call them, and mere imaginings sometimes change places!

Since then two and a third centuries have slipped away, and again do we find ourselves in a cycle of wonders which this time we make no doubt are really wonders, and no mere commonplaces tricked out in the hues of our own fancies. In one sense, to be sure, there are no wonders. Each thing which a day brings forth has had its foundations laid and its opportunity prepared from of old, before there were suns or stars. But while everything thus enters into the "one increasing purpose" which "through the ages runs," while all things in a sense are equally inevitable and equally necessary, not all things are equally impressive. There are crises in the movement when the agencies emerge from the stream of circumstance, and stand visibly forth. There are dramatic moments which really gather up into themselves ten thousand separate, errant impulses, combine them, and launch the resultant forth portentous, irresistible. And at such moments nothing can avail to cheat the human heart of the joy of wonder.

Then again, our centuries, as we know, are mere fortuitous units of measure. We cannot conceive them as having any vital or necessary relation whatever to the great movement and destiny of human affairs. Yet how strange it is that, as we look back over the nineteen hundred years of our era, we find the events of real significance and moment somehow clustering about these milestones which we have set up to keep us from losing our way! There is the first great defeat of the Roman legions under Varus at the very opening of the count—prophetic of long centuries of losing battle for the old world-order, and the passing of the sceptre to a race that should make the world new. There is Constantine and the establishment of Christianity at the

third milestone. There is the deluge of northern invasion, and the sack of Rome at the fourth; Theodoric the Goth, Clovis the Frank, and the faint glimmerings of a new order at the fifth; Mohammed and Gregory the Great at the sixth; Charlemagne at the eighth; King Alfred at the ninth; the first Crusade at the eleventh; King John, *Magna Charta*, and St. Francis at the twelfth; Dante—the "voice of ten silent centuries"—at the thirteenth; Chaucer at the fourteenth; the discovery of America and the re-discovery of the world of classical thought at the fifteenth; Shakespeare and Queen Elizabeth at the sixteenth; the English Revolution at the seventeenth; the French Revolution at the eighteenth; and, most striking of all, the meeting of innumerable streams of human effort, interest, and tendency within the last few years of our own time. Nor does it seem that this impression of the coincidence of the critical nodes of history with the century periods can be wholly illusory, or the mere result of suggestion from our own sentiment or fancy. The instances are too numerous and too vital, explain them how we will.

In looking at matters so immediately at hand as these last we have not, of course, the true perspective, and cannot surely discern their importance, absolute or relative. But our interest we cannot withhold, nor can we suspend our judgment altogether. We still must try to read them as we can. Approaching thus the events of recent years, we are aware of a certain increase and heightening in all departments of human affairs. There is an acceleration of movement and a crescendo of volume beginning indeed far back, but rising now with a steepness of curve which speaks a climax at hand. In the realm of science and the industrial arts—to cite but a single example out of scores—there is the advent of the new power of electricity, with its vast range of already demonstrated uses, and its almost infinite possibilities yet in store. So tremendous is our pace that it already seems as if electricity were an old-time servant of man. It takes an effort to recall that, but

a score of years ago, the force which drives our thundering chariots, and the fire which kindles our cities with splendid illumination, and sets them like flashing diadems upon the brow of night, was scarcely known outside the laboratory; that but three or four years ago Roentgen rays and wireless telegraphy were things undreamed of. Within this same short period again what developments have we seen, both sinister and benign, of the far-reaching power of human organization and combination—in trusts and in labor-unions, in the Red Cross society, the political boss, and the sympathetic strike! In our own lives, professional, commercial, domestic, what quickening of pace, what fierceness of competition, what accession of splendor, of complexity, of care;—until the lives we ourselves lived in our boyhood now seem to us as slow and as far-away as the days of Methuselah! There are few of my readers, I imagine, who do not remember when the map of Africa was mostly a great white blank; when the now truculent German Empire was an infant in swaddling clothes; when Italy and Japan were still in the womb of the feudal ages; when it was supposed that the far-shadowing power of Russia might be effectually "cribbed, cabined, and confined" by turning the key of the door at Constantinople. On the last tragic act of Spain's long struggle for colonial empire, the curtain has but just fallen; and but now our own country, parting company with the traditions and maxims on which was nourished her "youth sublime," steps jauntily forth into the race for the self-same prize.

But beyond all this general deepening of interest toward the close of the century, there seems to be a special emphasis laid upon its very last year, so as in some true sort to single it out, and to give it a far better right than Dryden's ever had to the title of *Annus Mirabilis*. I have no ambition to wear Dryden's laureate wreath,—or even Austin's, his successor *longo intervallo*; yet in more modest fashion would I venture to set forth the claims of the year 1900 to distinction.

Among these claims I do not include that singular dispute, at once fierce and whimsical, which ushered it in, and which raged all the way from peasant to pope, and mayhap still lives—the dispute as to which century it is to which the year rightfully belongs. Indeed, I should not be at all surprised if some of my readers were ready at this moment to take up the cudgels on one side or the other of this famous controversy. But against all such I record my veto. A truce to all such untimely quarrels! It is enough that it was a year of stirring movement and world-wide surprise, at the end of—and fit to stand in either enumeration at the end of—a century more surprising and more stirring, perhaps, than any other that can be named.

In the interest still of peace, though the matter is of graver import, I shall lay no special stress upon a circumstance which connects our year significantly with Dryden's; namely, the appearance of the plague once more in England and Scotland, to say nothing of places nearer at hand.* The plague had not visited England since Dryden's time, nor any part of western Europe since 1722. Its steadily diminishing area and destructiveness induced the hope that the force of this the deadliest of all epidemics was really spent. But such is found to be by no means the case. And, though we have reason to think that the improved medical skill of our day and improved sanitary science may defend civilized peoples from such horrors as once were common, it is well not to be too confident, and to bear in mind the lessons all too easily forgotten of the plague-scare of the year 1900.

Among the other things which combine to make the year really memorable there stands out, first of all, the South African war, the main movement and brunt of which fell within the year, although its beginning was earlier and its end is not yet. The chief dramatic and spectacular interest of that war lay, of course, in the heroic and amaz-

* An angry discussion is still going on (Feb., 1901) as to whether the plague did or did not appear in San Francisco during the year 1900.

ingly effective defense, maintained single-handed and for so long, by a few simple, rural folk against the whole available power of the richest and strongest nation in the world. This interest the conflict always will have, no matter what may be thought of the merits of the question at issue. But this is not all. Whatever may be its final outcome, it seems certain that this war is the last and most tremendous act in that long drama of strife for commercial and colonial advantage between English and Dutch, the beginnings of which date back, as we have seen, to Cromwell and Charles—so strangely and indivisibly are things far and near bound up in the same bundle of fate! The *last* act this surely must be, because at home the Dutch have long since withdrawn from the "swagger set" of Europe, and are there secure in their lowliness and the consequent protection of their stronger neighbors. The few colonial interests they still retain are probably safe under the same guarantee. And nowhere more in the world can there be found a detached mass of Dutch folk so circumstanced as to tempt or to provoke attack.

The war is memorable again from yet another point of view. Quite up to within our own life-time Africa has been almost the only remaining exemplar and stronghold of a world-order that dates back far beyond the dawn of history. Throughout the whole continent, with the exception of Egypt and an intermittent fringe of areas along her coast, there flourished in all its fierce glory the great Mammalian Age,—in its characters and marks essentially the same as that whose records are elsewhere read in the rocks, and which in Europe, Asia, and America passed away untold centuries ago before the rising power and competition of man. Within the remembrance of the youngest of us the elephant and the rhinoceros roamed over the plains of Africa, or crashed their way through her trackless jungles. The hippopotamus and the crocodile swam her rivers. Apes, baboons, and gorillas peopled the tree-tops. Countless herds of wild cattle, camelopard, deer, and gazelles

ranged over the veldt or browsed in the thickets, furnishing food to jackals, hyenas, leopards, and to the lion, king and master of them all. In the midst of all this fierce and teeming life, himself a part of it, hunting and hunted, fiercer and wilder than any, lived also man, not yet so far emerged as to master and subdue it, or to subdue and master himself.

—“Dragons of the prime,
That tare each other in their slime,
Were mellow music matched with him!”

How much longer this state of affairs might have lasted we know not, had it not everywhere been broken in upon and disturbed by the modern spirit of adventure, by exploitation of all sorts in the interest of commercialism armed with modern resources and weapons, and by the eager competition of European powers. Against this invasion and transformation the Boers deliberately set themselves, when they sullenly harnessed their ox-teams, and turned their backs forever, as they hoped, on the new order of things and on the English as its chief exponents. Profiting by the added power and resource which the touch of civilization had given them, they would preserve that savage age, that old-world order, for themselves intact, or at least no further modified than the conditions of their own life rendered inevitable. Thus they became an effective and organized barrier directly in the way of the march of the new order of things. They became, in fact, the *only* effective barrier; for forests, mountains, rivers, deserts, disease, and savage man himself offer but slight resistance to the determined onset of civilization. But this barrier was quite of another sort, as the event has proved. And now that it too has gone down in ruin before the ever-rising tide, we cannot but lament the destruction of that brave and steadfast, though misguided, folk, who flung themselves thus in the pathway of fate. We cannot but denounce the unholy greed and chicane which at last precipitated the conflict. We cannot but wish that some kindlier way had been found to change

the settled resolution of those men. But as long as the resolution held, sooner or later, with pretext or without it, the conflict was inevitable; and of the conflict there could be but one issue. No human barrier can stand against such an ever-rising tide;—nor ought we to wish it to stand. It was in the order of nature that it should give way. So viewing the matter, I doubt not that the South African war, hateful as indeed it is, will finally take its place as one of the most dramatic and conspicuous crises in the fading away of the old order from the last quarter of the globe, and the incoming of the new.

Yet "Woe unto the world because of offences," says the good book, "for it must needs be that offences come. But woe to that man by whom the offence cometh!" The war into which England so jauntily entered has proved to be one of the most serious crises in all her recent career. It had not progressed far before it became apparent that her prestige in the face of the world was at stake, and after that her empire itself. With unflinching determination and superb hauteur she addressed herself to meet the emergency. Such a magnificent single exhibition of power I doubt whether the world has ever seen. To wipe out the disasters and blunders of the opening campaign, she sent 270,000 fighting men to the antipodes, with the most distinguished of all her soldiers to lead them; and there they are still engaged. Five hundred millions of treasure spent, not counting that which war has destroyed; seventy thousand of her sons killed, wounded, dead of disease, or invalided home;—and all as yet unavailing either to hold in security the territory overrun, or to defend from invasion Cape Colony itself. The tremendous strain of the effort is seen in the nervousness of the English public, its lack of composure in the face of trifling reverses, its hysterical welcome of returning troops, its threats of stern reckoning some day with those who have brought England to such a pass; it is seen in the unexampled and anxious alacrity with which England's daughters have hastened to strengthen her

hands. Not victorious yet is she, but never so splendid and so terrible as in this her hour of supreme effort and supreme need. And what if it should turn out, as indeed it may, that this is in very truth her supreme effort? What if, when the subjugation is complete, it should mark the very turning-point in England's career? Outside of her own family England is nowhere beloved in the world. Not merely her pride—her very success has gained her enemies on every hand. She still keeps her place in the lead, but with visibly greater effort and with sharper competition. What if the legacies of bitterness and hate growing out of this very war, the added jealousies and complications on the part of her neighbors, the lasting strain of reorganization and control should together suffice to turn the trembling balance slowly against her? What if Africa should be, as has been prophesied, the grave of the British Empire? *Absit omen!* Yet such things have been. Should it be so,—should the future historian point to this very year 1900 as the climax of England's power and the beginning of her decline, then would it be an *Annus Mirabilis* indeed.

On these last lines the ink was not dry when tidings from across the ocean made it seem as if Death himself had set his seal upon the distinctions of the year by making it the last of the longest and most memorable reign in the annals of England,—perhaps the most memorable in the annals of the world. Though the physical life of the great queen outlasted by some brief days the wonderful century with which she was so signally identified, and the wonderful year of its close, yet the century was for her the real terminus. Her last public act was to welcome home, doubtless from his last campaign, the great soldier who on the stricken fields of two continents had led to victory her "far-flung battle line;"—and so soon it was his duty to lead the solemn funeral pomp which bore her away to the tomb! Fifty years before, while her reign was still young, Wellington was laid to rest—

"in streaming London's central roar,
Where the sound of those he wrought for
And the feet of those he fought for
Echo round his tomb forevermore."

And fifty years before that was Nelson. "O eloquent, just, and mighty Death!"

While one ancient order is passing away in Africa, another less ancient to be sure, but of far greater human interest, is passing away in China. In Africa it was the oldest biological order anywhere extant on so grand a scale; in China, the oldest organized civilization that yet survives in the world. In outward features the Chinese Empire belongs to the same old-world order as did Assyria or Persia or Babylon. It is the same huge aggregation of loosely-coherent provinces ruled by great satraps or viceroys in very uncertain dependence upon the central power. There is the same Babel of tongues, even though the tongues be closely related. There is the same absence of national feeling, national ideals, and national loyalty. There is the same eternal dominance of intrigue as the prime motive force in civil life and government. On the other hand, China is singularly unlike all those in its strong unity of stock or race, and in its remarkable identity throughout in traditions, in prepossessions, and especially in literature, in ideals of life and character, and in habits of thought and action. Not only so; this remarkable unity has survived conquests and changes of dynasty, and is, no doubt, in part the cause, and in part the effect of the surprising endurance of the Chinese order, while all others of its type have passed away. China and Africa have thus become, though in different senses, the two remaining strongholds of the past in a world which is elsewhere new. By her vast mass and inertia, as well as by her lodged and settled hatred of innovation, China, like Africa, has found herself directly in the way of the modern movement and idea—a huge sand-bank sapped by the waves of an ever-rising tide. Because of the special lines on which early European trade was developed,

because of the higher rank of her productions, and because she was a definite organization, China was brought earlier than Africa into the stress of conflict and struggle. The first note of it was sounded in the advent of the Portuguese nearly four centuries ago. The acute stage was reached nearly a hundred years ago when an English ambassador at Pekin was driven forth with contumely, for refusing to acknowledge that his sovereign was a vassal of the Emperor of China. And now at the century's close has come the catastrophe with a crash that has shaken the world. It seems more than a striking coincidence that here too the precise point of rupture was the right of embassy. It is rather another startling result and token of the profound isolation of the Chinese system from the thoughts and ideas of the great world about it. It is another striking demonstration of the irrepressible conflict between it and that instinct of modern civilization which everywhere, and as its first condition, demands freedom of intercourse and of movement.

The appalling events of the great outbreak of 1900, and the yet more appalling events which have followed in its train, there is surely no need to recount here. And of these also the end is not yet, nor can the keenest vision discern what the precise outcome shall be. But that it is the catastrophe which we are contemplating, and not merely some passing accident, few any longer doubt. Few now have any lingering thought that the outcome may be the reestablishment of the old order. Whatever form reconstruction may take, we may be sure that the new order of ideas, and not the old, will rule it.

In this connection I cannot forbear to speak of a tendency of feeling and of utterance in our midst, which has of late been greatly accentuated, and which to some at least is a matter of great surprise, if not of grave concern. "My kingdom is not of this world" said the Nazarene when questioned as to a possible appeal to force in support of his doctrine. "Put up thy sword again into his place," he said

to an overzealous friend who would openly make that appeal;—"all they that take the sword shall perish by the sword." And again, "Blessed are the meek, for they shall inherit the earth;" and "Love your enemies, bless them that curse you, do good to them that hate you, and pray for them that despitefully use you and persecute you; that ye may be the children of your Father which is in heaven." Though the lesson is a hard one, it seemed as though at last the followers of the meek and lowly Jesus were beginning to take it to heart. The church, and especially its ministers, it was felt, were permanently pledged to the cause of peace, and could not consistently be found among those who clamor for vengeance or openly fan the passions which lead to war and bloodshed. Yet in our country, at least, all this seems to have been changed within these last few years. I fear it is not too much to say that the body of our American clergy was prompt and eager to urge on this nation into war with Spain. There were, of course, many and noble exceptions. But so far as my observation and impressions go, that minister was the exception who lifted up his voice in protest; and that religious paper was the exception which did not, and which does not now, defend it. Was it a wave of popular enthusiasm which swept them from their moorings? Was it specious sentiment? Was it the traditional Puritanic hatred of all things Roman? Or shall we be told that herein is no real paradox at all? I know not. And now throughout all this dreadful business in the Philippines and this more dreadful business in China, almost the only voice we hear, whether from missionaries in the field or from their supporters here at home, is the constant demand for more force, greater severity, harder conditions, more blood. The case is one which excites wonderment in the onlookers, even among those who are glad to find this unlooked-for support in their schemes of conquest. But are the gentleness and love which Christ preached so long ago now antiquated, and are fierceness and vengeance to take their place? Was Mohammed

right after all? I cannot undertake to answer these questions nor to explain this not the least surprise of the century-closing year.

Yet while the tragic and somber phase of this tremendous drama in China has occupied our chief attention, its exigencies have brought into counterplay a movement and tendency which seems to me prophetic not of downfall and doom, but of hope—a new and larger hope for the world. The great old-time civilizations were all separative, divisive. Each conceived and developed in practical isolation one, single master-idea. The Hebrew idea of righteousness, the Greek idea of intelligence and ordered beauty, the Roman idea of social organization were thus separately worked out. It required the whole lifetime of a great race or nation, and all its genius, to bring one of these ideas to such clearness and perfection as to permit of its being passed on to others, and so becoming part of the inheritance of the ages. Each civilization developed its idea as far as it could be developed alone. Yet each idea was after all but a partial one, in itself insufficient for the basis of a complete and lasting civilization. Each needed the support and help of all the others before there could be a perfect society. Indeed, it was precisely because of the lack of complementary and supporting ideas that each of these old civilizations was doomed to fade away. The problem of the ancient world was therefore the discovery and the development of these master-ideas singly. The problem of the modern world is the combination and adjustment of them to make a complete and sufficient basis for a permanent human society.

The Roman was the last effective civilization of the ancient world—the last one able to impress its idea upon the world that was to be. And its idea, the idea of an effective human organization, was developed in such imposing grandeur that, during the long centuries which followed its downfall, that idea still dominated the hearts and thoughts of men. The efforts of the Middle Age were for the most part pathetically ineffective. They were like

the efforts and struggles of men in dreams. But the dreams of the Middle Age were true to its own nature and character; they were grandiose, romantic. And at the heart of them all was the Roman universality—the conception of an all-embracing unity. During that feverish night and troubled dawn the Middle Age had three such splendid visions. And though they came sadly short of realization in actual practice, those dreams were truly prophetic, and are still to us of these latter days the hope and the promise of the world. The first was the dream of an all-embracing unity and organization of spiritual life—a church of which every man born into the world should be a member—the Holy Catholic Church. Its second was the dream of a world-embracing civil order of which every man should be a citizen,—the Holy Roman Empire. And the third, its dream just before dawn, and so, according to the old belief, destined to a nearer fulfillment, was the dream of a world-wide fraternity of the sons of light—of souls whom the truth had made free—the University. The conception of the University was that of a State—a *civitas*, as its diplomas still attest; a republic not of this world, but of the world of ideas. Its local institutions were to be but chapters of a universal society. Its members were to be really free as were no other men. By virtue of their common language they were actually free from the heavy curse of Babel. By virtue of their superior illumination which should make them a law unto themselves, they were to be actually free in large measure from the trammels of the civil law, made only for knaves and fools. And, best of all, their spirits were to be free—free to think, to learn, to know.

But when the modern day at last broke, organization and civilization had to begin on a scale much smaller than that of these dreams. For many centuries the nation was to be the largest whole with which human effort could successfully grapple. As the modern nationalities one after another emerged from chaos, each was forced to work out its own civilization very much by itself. Each had to make

its own adjustment of these master-ideas under its own peculiar conditions, and in accordance with its own peculiar genius and limitations. And nations differ not merely in natural gifts and advantages, but in age and in experience as well. Germany, Italy, and Japan were born into the family within our remembrance. Furthermore, the very virtues of nationality,—loyalty and patriotism,—operate as barriers to sympathy and the free play of ideas quite as much as do the commercial and material discriminations which national competition imposes. It is plain, therefore, that in the present—the national—stage of civilization there still is, and must be, much that is separative, divisive, partial. And yet in spite of the provinciality, the jealousy, the Philistinism of our modern world, one feels that civilization, wherever it now exists, is after all *one*, and not many as was the case in the ancient world. And there have been of late intimations not a few that the growth of the free spirit of man cannot much longer be kept within the limits of the national phase of organization. Such limitation was indeed necessary, and has been of immense advantage at the start. The nation was the seed-bed, the nursery; but the field is the world. Beyond the nation on every side stretches humanity itself, transcendent, limitless. Civilization can never be complete or perfect for any until all are partakers. The separate seed-plants must grow to touch and support one another, must cover the whole earth with their shadow before the golden harvest can really ripen or be gathered.

This it was toward which the dumb heart of the Middle Age so strangely yearned, and which for one group of men it so nearly realized in its University. This it is which for the same group is now realized in the almost absolute community in spirit of the truly cultured and learned throughout the world. This idea was the vital and lasting element in that profound and far-reaching stir of human life which we miscall the French Revolution. This is what prompted the wonderful missionary activity of the century just closed.

This it is which in recent times has caused a constant enlargement of the realm of international law and of international activity and coöperation of all sorts; such as the federation of the Australian Colonies just consummated. This is bringing about the gradual dawn of a world-consciousness and a world-conscience, as seen in the Red Cross Society and the Peace Conference at the Hague. But not less significant and impressive than these was the prompt and instinctive rallying of all the great powers of civilization as one man to meet the emergency in China. That emergency portended no appreciable danger to those great powers as separate nations, for it could not reach them;—much less a danger to their united force. But the Boxer movement, by its determined stand against intercourse and against ideas, far more than by its lawlessness and violence, was a menace and a defiance to the spirit of civilization itself. This, I take it, was the real issue, and this the ground of that unexampled unanimity of impulse which astonished the world. The true significance of that common impulse is not, in my view, altered at all by the greed and violence on the part of civilized nations which goaded into frenzy those unhappy people, and so precipitated the event, nor by the pillaging and wanton cruelty which seem to have disgraced the military operations, nor even by the selfishness which now seems certain to determine the immediate outcome. That the instinct of civilization should so assert itself,—should, though for one brief moment, so overshadow national jealousies and self-seeking,—is indeed memorable, prophetic.

Such, all too hastily and meagerly set forth, are some of the thoughts which come surging to mind as one turns to gaze upon the solemn pomp of the great year just past, and listens to its trumpet-note still echoing to remind us that "the old order changeth, yielding place to new." It is much to have lived through such a year with heart and soul at all awake to its true import. It is more to have come, as most of my readers have done, to such a year as the

climax and crown of a long procession of such years of ever-increasing volume and power;—years watched with eager interest as they swept grandly by, and still vividly real in memory and imagination. But happiest of all is the lot of those who, having looked with us as from Mt. Pisgah upon the promised land, are also privileged to enter in and possess it. The Century is dead. Long live the Century! Be it for us longer or shorter, from memories and musings such as these we turn with new courage to the hope set before us—the hope of a new world.

"Clasp, Angel of the backward look
And folded wings of ashen gray
And voice of echoes far away,
The brazen covers of thy book;
The weird palimpsest old and vast
Wherein thou hid'st the spectral past;
Where closely mingling pale and glow
The characters of joy or woe;
The monographs of outlived years
Or smile-illumed or dim with tears.
Even while I look, I can but heed
The restless sands' incessant fall,
Importunate hours that hours succeed,
Each clamorous with its own sharp need,
And duty keeping pace with all.
Shut down and clasp the heavy lids;
I hear again the voice that bids
The dreamer leave his dream midway
For larger hopes and graver fears:
Life greatens in these later years,
The century's aloe flowers to-day!"

THE LITERATURE OF CHINA.*

BY JOHN FRYER.

On a previous occasion this Association listened to a paper on the Chinese language. With that as a basis we are in a position to enter upon a sketch of the very ample and discursive field of Chinese literature.

There is a great variety of opinion as to the value of the wonderful books of the Chinese, which have formed and confirmed the national taste and have exercised an influence which is without parallel in the world's history. One writer tells us that "untold treasures lie hidden in the rich lodes of Chinese literature"; while another, on the contrary, informs us that "it is only a barren wilderness." One finds in it "eloquence and poetry enriched by the beauty of a picturesque language, preserving to imagination all its colors," while another meets with "a tedious uniformity, wanting in accuracy and unenlivened by humor."

The truth we shall doubtless find to lie between these two extremes. We must not expect to discover any information of much practical value to the present age; but if we take an interest in the history and growth of a civilization in all its various departments on entirely different lines from our own, and wish really to understand and get to the heart of this ancient and wonderful people, we can thoroughly do so only by making the careful

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acquaintance of their literature, which is the depository of all they believe to be worth knowing.

Whatever value we may place upon them, we cannot take a comprehensive view of these long-continued literary efforts without realizing that they are a key to the inner life of a great people, and as such are worthy of our respect if not of our admiration.

There are two things which strike our attention at the very outset. One is the enormous bulk and amount of this steady accumulation of upwards of forty centuries. One catalogue of the old standard works, excluding novels, Buddhist translations, and all works published within the last century or two, gives an account of 93,242 separate works, and is itself contained in 112 octavo volumes. Since this old catalogue was compiled the additions to the literature of China have been on the same gigantic scale. About half a century ago printing from movable metal type was introduced, and this was followed by lithography and photo-lithography; so that China is now deluged with books of all sorts and descriptions, and modern Chinese literature has received an impetus that has caused large book shops to be started in all the larger cities and towns. Their shelves are bending beneath the weight of new publications as well as reprints of all that are deemed the best books handed down from ancient and mediæval times.

Another thing that forces itself on those who take up the study of Chinese literature is the regret that it is all written in the language and style of the learned, or the classical language—a language that requires years of patient toil for even an intelligent Chinaman to master;—and a style which is about as remote from the language of everyday life as Latin and Greek are from English. Fortunately the tendency of modern times is in the direction of a popular and easy Chinese style; and this has been necessitated by the growing demand for newspapers and periodicals as well as for general literature—which have to be written in a manner easily understood by the majority

of readers, so as to ensure an extensive and ready sale. The time is not far distant when the ancient classical and other works will be translated and published in the language of everyday Chinese life, just as we have our Bible and the best Roman and Greek authors translated into English for those who cannot read them in the originals. Yet we may be sure that the original text of the Chinese classics will never be lost sight of, but will be carefully studied by all whose means and leisure will permit them to do so.

No one can well deny that the Chinese are eminently a literary people, although their literature takes such a widely different form from ours. We find that from the very dawn of their civilization they have been noted for their literary abilities; and their literature justly ranks as among the oldest in the world. The causes that have led to their careful and widespread cultivation of literature are various; but the chief of them is because it is made the foundation upon which the whole of their social edifice rests, rather than, as among ourselves, an ornament which graces it. The whole government system of the Empire is professedly regulated in accordance with the books and maxims of the ancient sages. Knowledge of the classics and the ability to write discourses upon them became the road to power, to wealth, and to greatness. The *literati* are the gentry, the magistrates, the governors, the diplomats, and the ministers of China. When a parent urges his son to diligence in his studies, he can tell him with truth that he may thus become a high official. The government has for untold centuries been practically in the hands of those who have sprung from the common people, and who by means of literary pursuits have climbed the ladder step by step until they stood at the highest point of influence and honor. The Chinese have their list of their Lincolns and Grants and Garfields who have risen to greatness; but it is vastly longer than ours because their country is so much older.

With such strong inducements is it to be wondered at

that the Chinese have devoted a great amount of time and energy to the cultivation of their literature, and that they have attained a high standard of excellence in the particular branches to which their attention has been directed?

The countless volumes which have appeared and are still being published in all parts of China may be regarded as a mirror reflecting the national mind, the temperament of the people, their peculiarities, their excellencies, and their defects. Only such studies as commend themselves to the national taste are pursued to any extent; but in these they have shown the greatest diligence in research and activity in compilation. The results of their labor, however, all show a deficiency in the faculties of imagination and invention, as well as an inability to run beyond a certain degree of excellence or knowledge. Philosophy and history are their strongest subjects; but even in these there has been but very little progress in thought and style for two or three thousand years.

The cultivation of literature by the Chinese is an indirect means to an end, *viz.*, official position and employment; rather than, as it ought to be, for the direct benefits of its mental and moral discipline and enlightenment. Hence their attainments in literature do not correspond either to the importance they attach to them or the distinctions they confer. New opinions, new systems of philosophy, new forms of government, new theories to account for the existing state of things, new possibilities to which the nation ought to direct its energies, and a hundred other questions which in Europe and America would become subjects of the liveliest general discussion or interest, have been left almost entirely alone in China. In a nation almost always in fear of political agitation and jealous of innovation, any departure from the old paths and the well-known landmarks is at once deprecated and strongly opposed. Hence, wonderful as their literary labors have been in the past, the Chinese have been left far behind by the nations of the West; and their choicest works, embody-

ing the wisdom of thousands of years, contain perhaps but little that can be regarded by us as instructive or profitable for the present age. One by one their crude discoveries in science and art have been taken up, carried forward, and elaborated in the West, until their utmost limit of benefit to the human race has apparently been reached; or, at any rate, has been defined. In the same way the finest portions of their literature contain but little that has not already been expressed by Greek or Roman philosophers or those of more modern times, although it may appear in a somewhat different form.

Perhaps the best way to obtain a just view of what Chinese literature is as a whole is to compare it with our own of a few centuries ago. Take, for instance, the immense historical works or dynastic histories consisting of thousands of volumes; the still larger and more detailed works on geography and topography; the enormous encyclopaedias, such as the one in 1672 volumes which I have in my library; or the very comprehensive *materia medica*; and they will all compare very favorably with the best of those we had in Europe at the time they were written, or at which they had already become standard works in China—say five hundred to one thousand years ago. Remembering at the same time the isolation of China and the want of the vivifying influences of the competition of other countries pursuing the same researches and branches of knowledge, one cannot help admiring the comparatively unaided results she has achieved. Still more one may give way to one's fancy and wonder what, with her patient toil and passionate ardor for literary pursuits, might have been the result had China possessed all the advantages we have been blessed with in the West. What few chances she has had, however, when once understood and appreciated, have been readily accepted and made use of; as for instance the teachings of Buddhism and the scientific instruction given by the Jesuit fathers. Even now Chinese literature is being enriched more and more every year by translations and compilations from standard works of Western authors.

When we further consider the unsettled state of the government; the frequent changes of dynasty; the five great literary catastrophes, by each of which the previous accumulations of literary effort were almost wiped out; the discouragements that have so often been placed in the way of progress; the conservatism and national pride, the self-contained and self-sufficient spirit which her unique position in the world has brought about, we may well look with astonishment on the vast literary achievements which China has been able to accomplish under so many difficulties and disadvantages.

From the above facts we can easily see that although the literature of this nation has failed from many causes to attain any high distinction in the world at large, and has been unable even to begin to rival the depths of thought and the flights of genius which characterize that of the West, it has still a very great claim on our attention. It is the literature of a vast portion of the human race. It covers the results of the labors of thousands of literary men of high attainments which have been accumulated through thousands of years. The very fact of its breathing an entirely different spirit and being developed in entirely different forms from our own literature has prevented it from becoming a popular study among us. Further, it is of little if any practical value to this utilitarian age. We can take it up only as a subject of deep interest and curiosity, throwing a certain amount of light upon such studies as history, archaeology, philology, ethnology, and kindred branches of research.

The so-called "Celestial Empire" requires very peculiar and special treatment by foreign powers, who can do themselves and China full justice only by obtaining a clear understanding of what is embodied in her literature, and what she holds forth in it to be the highest and noblest features of character that are worth striving for. It is by this standard the Chinese judge themselves, and they expect us to come up to it.

We may here ask as to the method of classification of Chinese literature. In the T'ang dynasty all existing literature was arranged under the four divisions of the classics, the histories, the philosophies and arts, and polite literature and poetry. This arrangement is the one that has been in use up to the present time. These main divisions are so numerously subdivided that a mere list of them would occupy several pages. Even a resumé of the whole of the vast field thus covered would be impossible in the narrow limits of the present paper. It is sometimes difficult to understand the reason of the systems of classification pursued by the Chinese. But their system of division seems to work satisfactorily with them, and is to be found in the Imperial Library, in large private libraries, and generally in large book-publishing and book-selling establishments.

Let us now suppose ourselves to be paying a brief visit to a large Chinese library, and as we pass through its four principal departments let us take down and examine here and there a work in order to get a good general idea of the whole range of the national literature. We shall find that Chinese books are generally bound up in volumes from a quarter to half an inch thick, the covers being of soft paper and fastened with silk threads. They are piled up horizontally on the book-shelves, which are labeled with the class or division that the book belongs to. A paper label hangs down from the first volume of each separate work to facilitate research.

(1) We first come to the department of the classical writings, which occupy the foremost position in the Chinese mind, not only on account of their great antiquity, but also because they are regarded as the foundation of all learning, and are the basis upon which a large proportion of the magnificent structure of Chinese literature has been erected. The Chinese classics consist of the five "King" or canons, and the "Four Books." They have been compared to our five books of Moses, and our four Gospels. These various classical writings, reaching back in some instances to three

or four thousand years, have all been commented on in extreme detail by various ancient and modern men of note. But the commentary published by imperial command is the only one allowed to be bound up with these classics and studied in connection with them. This commentary gives tone and color to the ancient text, and without it many parts would be of doubtful interpretation. One feature of these commentaries is the utter absence of anything like a religious spirit. They are atheistic or materialistic in character and tendency, and this does not accord with the ideas of the more ancient classical books.

Under the head of classical works the Chinese reckon their various dictionaries, in the compilation of which a vast amount of labor has been bestowed for the purpose of maintaining the purity of the language. The noted Kang-hsi dictionary, giving the sound, meaning, and use of forty thousand or more words, compiled under the direction of the Emperor Kang-hsi toward the end of the seventeenth century A.D., belongs to this division.

(2) We must now pass on to the second department, containing the historical writings. Under this great division are the four principal classes of history, biography, geography, and topography, with many others too numerous to describe.

The historical works of the Chinese are one of the most important features of their literature. First came the dynastic histories, compiled dynasty after dynasty after a general plan. These take up the imperial records, the arts and sciences, and the biography of eminent men. The latest compilation is called the "Twenty-four Histories," comprised in three thousand two hundred and sixty-four books by twenty-four different authors, commencing with the Herodotus of China, named Sz-ma-ch'ien, whose writings cover the period from remotest antiquity up to 122 B.C. This work is undoubtedly the largest history that has ever been compiled, and terminates with the end of the Ming Dynasty. Other voluminous authors have written the his-

tory of the present dynasty on the same grand scale. One of the saddest acts of vandalism on the part of the defenders of the British Legation at Peking during the recent siege was the destruction of the historical records stored in the Hanlin, or Imperial Academy, on the north side of the Legation. These can of course never be replaced. We can only pause to look with astonishment upon the voluminous and exhaustive works of reference on the three important subjects of biography, geography, and topography.

(3) We next come to the third department, where we find the philosophies and arts. This is made to include religion with the sciences and is thus very comprehensive. Many original thinkers are to be found among the Chinese philosophers of past ages who propounded very different views from those of the early sages. Most of their works are still in existence, and in some of them we find ideas that saw the light of day in China long before they were ever dreamed of by our Western moral philosophers. Moral philosophy has been a favorite theme among the Chinese from the earliest times. Some of their writers are as much to be admired for the style of their compositions as for the sagacity of their systems. The most modern classification of these so-called philosophies and arts is under fourteen divisions. Each of these divisions is still further subdivided; and so it is throughout the library. But time will not admit of an extended notice of the fine collections of works in this great department, in which astronomy, medicine, legislation, novels, agriculture, mathematics, and enormous encyclopedias are prominent features. The Buddhist and Taoist works alone are more than enough reading for a whole lifetime.

(4) We pass on to the fourth department, which is the drama and poetry. This is the last and by far the largest of the four great divisions of Chinese literature. With regard to Chinese poetry we find that the Chinese have been lovers and worshipers of nature from the very earliest

times. Long before we in Western lands awoke to all the charms and beauties of the creation, and began to express them in song, the Chinese had been accustomed to manifest their passionate love of nature in verse of a high order of literary merit. The art is still pursued with ardor and held in the highest esteem. A thorough acquaintance with it is considered essential to those who seek public employment; as it forms an important feature in their examinations. The adherence to ancient poetical laws has been a cause that has checked the attainment of a high standard in modern times.

Unfortunately we cannot translate Chinese poetry so as to bring out its original meaning. The sparkle of wit and the points of allusion are lost to our inappreciative Western ears. The rhyme and rhythm disappear, and the finest Chinese poetry becomes the tamest prose, with its spirit and imagery all gone. If we attempt to translate it in a metrical version and clothe it in appropriate language, the original character of the composition becomes entirely changed. The very terms consecrated to poetry are altogether different in the East and West. For instance, our Alps and Appenines change into the "Kwan-lun" and the "T'ai-shan;" our rose and violet are represented by the epidendrum and the hibiscus; while the wild goose is the image of a tender and faithful lover, instead of the dove as among ourselves.

Chinese poetry does not partake either of the epic or of the pastoral description; but with these exceptions we find all the classes that we have in the West. The poems are all more or less short and deserve rather the name of odes and songs, many of them resembling somewhat the shorter compositions of Cowper and Wordsworth. Their theme is generally a combination of some of the grand or beautiful objects of nature, with reflections or descriptions of the existing state of public affairs, or of the peculiar condition of mind of the poet.

Poetry flourished most in the T'ang dynasty, in the

ninth and tenth centuries, which have been described as the Augustan age in China, of poetry and letters. The collected poems of the T'ang dynasty have been published by imperial authority in nine hundred volumes.

The object of all regular poetry seems to be to conform as closely as possible to the very stringent rules of the art, and to make the diction as perfect as possible;—the thought or sentiment being only of secondary consideration. The country being flooded with poetry manufactured in this perfunctory way by people of whom not one in a thousand has the poetic gift born in him, the national taste has reached a very low ebb, and China for many centuries past has not produced a poet of any renown.

The drama, as one would easily imagine, is a popular form of Chinese literature, although it labors under very great disadvantage. The profession of play-actor is regarded as one of the very lowest. Theatrical performers, butchers, and barbers with their descendants to the third generation are associated together as unfit to be allowed to sit for government examinations, and to attain literary honors. Under such humiliating circumstances China can boast of no national dramatists. Numerous pieces, however, have been produced, especially in the dynasties of T'ang and Yuan, and a collection of plays is in common use amounting to one hundred, called the "Hundred Plays of the Yuan Dynasty," which is supposed to contain the most renowned efforts of ancient and modern times. Some of these have been translated into English or French.

Chinese classify all dramatic performances as "Wen," or literary, and "Wu," or military. The former class which faintly resembles the plan of the historic plays of Shakespeare, is never very popular; while in the latter the fierce, rough representations of fighting, intrigues, quarrels, etc., interspersed with songs and by-plays which are often of a very objectionable character, seem to find the most unbounded popular favor.

In this hasty sketch of the works usually found in a

Chinese library, we have confined our attention so far only to the standard books which are universally accepted by the highest authorities. But it must be remembered these form only a very small portion of the whole literature of China, which it would take a course of a dozen lectures to begin to do full justice to. In China, equally as much as in America, the words of King Solomon find their apt fulfillment, "Of making of many books there is no end." Those who would like to pursue this subject further will find the excellent treatise of Professor Giles of Cambridge University, England, entitled "A History of Chinese Literature," of especial value. It is just about to be published by D. Appleton & Co., of New York.

THE DEVELOPMENT OF THE PETROLEUM INDUSTRY.*

By EDMOND O'NEILL.

The most remarkable achievements of the nineteenth century are those of science, and in this work the chemist plays no mean part. If the chemist were asked to name a single substance that would epitomize the development of the applied chemistry during this time, he could easily say petroleum. Not that its technology is greatest in money value or necessity to man, but it is essentially of the nineteenth century. Iron, steel, copper, cement, dye-stuffs, sugar, starch, soap, and many other measures of the degree of civilization, have been prepared on a large scale for centuries. The petroleum industry was born barely forty years ago. Heat and light are absolute essentials for our modern civilization. Petroleum furnishes both, and not only does petroleum furnish the foundation, but the superstructure is, to a large extent, made up of petroleum products.

The modern organic chemistry, with its countless compounds, may be said to be the chemistry of petroleum products; dye-stuffs, perfumes, germicides, all have petroleum derivations as their bases. The modern pharmacopeia bristles with names of preparations that are warranted to cure any of the equally numerous modern diseases. And

* Read before the Science Association of the University of California
March 13, 1901.

yet we stand only upon the threshold of the new synthetic chemistry. No one can tell what the future will bring forth. We only know that in petroleum we have the raw material that will enable us to solve the unending problems.

We say that the petroleum industry is but forty years old. The substance itself has been known from time immemorial. Ages ago the Chinese employed it for evaporating brine; the Egyptians used asphaltum and other petroleum products for embalming. Herodotus, 500 B.C., describes certain rock oil springs in Zante. Plutarch mentions that a burning oil occurred at Ectabana. Pliny and Discorides relate that illuminating oil was obtained at Agrigentum in Sicily and that the different springs yielded different varieties of oil, some so volatile as to be dangerous when used in lamps. The sacred fire burned for ages in Baku and in Burmah. Marco Polo describes various places where oil occurred. In America, it was no doubt used by the Indians long before the landing of Europeans. The first mention of its use in this country is in Sagard's *Histoire du Canada*, published in 1632, where it is related as occurring in what is now Allegheny County in New York and as being used by the Indians as a remedy for bruises. This same oil was sold for a long time for such purposes, under the name of Seneca oil.

From 1790 to 1820 numerous wells were dug along the western slope of the Alleghenies to obtain salt water, this brine being afterwards boiled down for salt. Sometimes a small amount of petroleum would accompany the brine, often in sufficient quantities to spoil the salt. Occasionally more oil than water would be struck, as, for instance, in one well dug in Kentucky in 1819 which still yields petroleum. Another one in Cumberland County, Kentucky, flowed in sufficient quantity to cover the Cumberland river; it became ignited, and the river was on fire for a distance of fifty miles. This was the first flowing well in America.

Numerous attempts were made to exploit these springs and obtain oil in large quantities, but were for a long time

unsuccessful. The wells that were dug were shallow and never yielded more than a small amount. One company, the Pennsylvania Rock Oil Co., organized in 1854, prospected for two years and then became discouraged. A few stockholders persisted, however, and employed Colonel E. A. Drake to continue the work. On August 29, 1859, he obtained from a well four inches in diameter and sixty-nine feet deep a flow of oil amounting to 880 gallons daily. It created great excitement. Hundreds of men instantly flocked to the region and numerous wells were dug. In 1861 a man named Funk drilled the first large flowing well. It yielded 100,000 gallons a day, and shortly afterwards another one near by of equal capacity was struck. The excitement increased tremendously. Where hundreds prospected before, there were now thousands, and oil wells were located over a large area in Pennsylvania, West Virginia, and Kentucky. Many yielded large flows and some of them are still profitable. Enormous fortunes were made and lost, but the industry increased until in 1880 the amount of oil produced in Pennsylvania alone amounted to 200,000,000 gallons annually. In 1884-85 the Ohio fields were developed, and the production of oil was greatly increased. In 1885 the entire yield of the United States amounted to 22,000,000 barrels of forty-two gallons each, valued at \$20,000,000. The entire production in all other countries at this time amounted to 14,000,000 barrels, valued at only \$2,500,000. Most of this was produced in Russia.

In 1893 the entire United States production was 48,412,666 barrels. The entire production in other countries was 84,330,804 barrels, of which Russia produced 33,000,000 barrels.

The enormous profits of the industry led to prospecting all over the United States and in many other countries. Oil was found to be very widely distributed. It has been found in quantities in Pennsylvania, West Virginia, Illinois, Indiana, Ohio, Kentucky, Texas, Arizona, New Mexico, Colorado, and California, and in small amounts in nearly

every state in the Union. Other countries which produced petroleum in larger or smaller quantities were Canada, Peru, Chili, Brazil, Trinidad, Barbadoes, Porto Rico, Mexico, Italy, Gallicia, Roumania, Bavaria, Austria Hungary, Alsace, England, Russia, Japan, China, Burmah, India, Persia, and Africa. Indications are present in practically every part of the earth's surface. In some of these regions the production has reached very large proportions, notably in Russia. The occurrence of oil in Russia has been known for a long time. Gas wells have burnt at Baku for centuries. In 1873 the region was systematically exploited by the Rothschilds.

Some of the Russian wells are enormous yielders, 50,000 barrels a day being not unusual. Some produce 100,000 barrels a day. The Tagieff well near Baku yielded nearly 3,000,000 gallons a day, over 11,000 tons. It spouted 224 feet from a ten-inch casing. Nearly 10,000,000 gallons were lost before it could be controlled. Something like this, though in a lesser degree, occurs in all oil regions. A 1000-foot well near Sabine Pass has flowed 600 to 800 barrels an hour; it spouted 175 feet, but most of it was lost. A California well has yielded 3000 barrels a day. A short while ago an Indiana well flowed 7000 barrels a day, but it was exhausted after a few days.

The history of petroleum in California is exceedingly interesting. Mr. W. L. Watts has made an extended study of this subject, and from his report to the State Mining Bureau, many of the facts regarding California petroleum were obtained. As in all other countries, its existence was known for a long time. The Indians employed it as a liniment. The Mission Fathers used the asphaltum for roofing purposes. In 1852 a small amount was distilled by Pico for illumination purposes. In 1855 a relatively extensive plant was established by Morrell in Santa Barbara, but the product was not very good and the manufacture soon ceased. The Eastern oil excitement of the sixties spread to California, and in 1865 there had been

formed sixty-five companies with a nominal capital of \$45,000,000. Many of these companies sold shares at high prices: \$1000 per share was not uncommon and \$1500 a share was sometimes paid. Glowing prospectuses were issued and many unwary speculators invested. Some of the accounts given were very amusing; for example, it was said that the ranchers of the region found the oil objectionable, as hundreds of cattle were mired and drowned in the oil exuding from the springs. This probably had reference to the asphaltum beds.

One company was exploited as follows: 10,000 acres were bought for \$22,000 in greenbacks, equal to \$10,000 gold. One-half was sold to Eastern speculators for \$50,000. This was resold for \$450,000 and then went as \$10,000,000 into the assets of the California Petroleum Co., which was advertised to have twenty natural oil wells of the largest size. Another company advertised that Spring No. 1 contained 144,500,000 gallons of oil actually in sight. Ten of these wells would yield in twelve months \$5,460,000. A man digging in a swamp dug up some mud that smelled of petroleum. A company was immediately capitalized for \$600,000. Oil properties were exploited in every county from Humboldt to San Diego. Fresno and Kern counties, what are now Coalinga, McKittrick, Sunset Districts, etc., were all prospected, but there was no permanent success.

The cause of the failure is easily seen in the light of subsequent developments. In the first place most of the companies were not *bona fide*. They existed on paper only and were formed for stock selling purposes alone. In the second place, the prospecting was not thorough enough and the wells not deep enough and very little oil was obtained. Thirdly, the oil obtained was very different in quality from the Eastern oil. It yielded practically no oil good for illumination, which at that time was the only use for petroleum. Fourthly, many scientific men of the day, notably Clarence King and J. D. Whitney, at that time State Geologist, pronounced the oil of no value

whatever, which was true as far as knowledge went at that time. In the fifth place, the supply was so small and uncertain that no demand could be created. All these influences combined gave a setback to the industry and it languished until 1887, when, according to the report of the State Mining Bureau, there were only four companies in operation. These companies were the Pacific Coast Oil Co., in Pico Cañon; the Puente Oil Co., in the Puente hills, in Los Angeles county; the Hardison-Stewart Co., afterwards the Union Oil Co., in Ventura county; and the McPherson Co., in Moody Gulch, in Santa Clara county.

The discovery of oil in Los Angeles in 1892 gave an impetus to the business. With an increasing supply came an increasing demand. Other districts were developed and it was shown that a large supply existed. This increased the demand and a ready sale resulted. In addition to this, was the probability of suddenly acquiring great wealth. The gambling spirit seized hold of the community and many people were eager to invest. Company after company was formed and an enormous amount of prospecting was done. Up to the end of last year over thirteen hundred companies had been incorporated with a nominal capital of about \$400,000,000.

Of course, many of these companies have not drilled a single well, but in the aggregate a very large amount of work has been done and the state bids fair to be thoroughly prospected. To get a clear idea of the present condition of the oil industry on this coast, it might be well briefly to consider the development in the different districts.

Petroleum seems to occur along the entire western slope of this continent. It has been found from Ecuador and Peru in the south to British Columbia in the north. In California it has long been known, and, as has been mentioned, was used by the Indians and Mission Padres. The immense deposits of asphaltum in the southern part of the state, and gas wells and oil seepages in other localities were almost certain indications that large amounts of

petroleum were buried beneath the surface. Desultory attempts were made at various times to develop this supply but with little success, until about 1875, when a company began to develop the Pico Cañon, in what is now known as the Newhall district. After passing through various vicissitudes it was finally in 1875 merged into the Pacific Coast Oil Co., and operations were conducted on a large scale. Many wells were dug, a pipe line forty-four miles long was constructed to the ocean at Ventura, and a large refinery built at Alameda Point. A tank steamer is used to carry the oil from Ventura. About 1883 the Hardison-Stewart Co. began operations on a large scale in Ventura county and later on combined with various other companies to form the Union Oil Co. This is also a large corporation with many wells, pipe lines, and a refinery at Oleum in Contra Costa county.

These two large companies did much to develop the industry then and showed that oil was present in considerable amounts over a large area in Los Angeles and Ventura counties. The next step in the development was the discovery of oil in the city of Los Angeles in 1892. This region, in common with many others, had been exploited in the sixties. A well was dug in 1863, but no oil was obtained. They did not go deep enough. In 1892 oil was obtained from a well about 375 feet deep. It created great excitement. In three years more than three hundred wells were drilled and most of them yielded oil. Other districts in the neighborhood were exploited and hundreds of new wells located. The production of oil rapidly increased until in 1897 it had reached 1,400,000 barrels. It then began to decline but still amounts to 1,200,000 barrels annually. The total amount of oil obtained from the Los Angeles district amounts to over 7,500,000 barrels. About 1400 wells have been bored, but only about half of them are now pumped.

Other districts in Los Angeles county have been worked for oil, the principal ones being Whittier, Fullerton, and

Puente. None of them have been as profitable as the Newhall or Los Angeles. Puente is the best. This oil is very light in gravity, so much so that most of it is distilled and only the residuum used for fuel. In Ventura county there are more than eight hundred wells, only about half of them being worked now. They are from 500 to 2000 feet deep. Practically all are owned by the Union Oil Co.

In Santa Barbara county oil seepages have long been known. In 1895 some wells were dug on the beach at Summerland and oil was struck at the depth of only 125 feet. Since then about three hundred wells have been bored, some on the beach and some in the ocean, 400 to 1200 feet from shore. Some of the wells are 1000 feet deep. The oil is heavy, averaging about 14° B. The yield is about 14,000 barrels a month. The Fullerton District, in Orange county, does not produce much oil as yet, although there are some one-hundred-barrel wells. The oil varies greatly in gravity, from heavy 14° to as light as 35°.

North of Tehachapi, the whole valley of the San Joaquin seems to be underlaid with oil, although as yet only a small area is worked. The principal fields are in Fresno and Kern counties. In Fresno county is the well-known Coalinga district. Prospecting was begun here in the early nineties and in 1895 oil was struck in paying quantities. One famous well in this district is the Blue Goose, now belonging to the Home Oil Co. This was dug by two men who were hardly possessed of a dollar when they began. They obtained their materials on credit and did all the work themselves. Many a time they were inclined to give up. Some of their friends scoffed at the idea of their obtaining oil at that point. They persisted and their efforts were rewarded by a flow of 3000 barrels a day, and the well still yields over 700 barrels a day. The Coalinga field is, however, very limited in extent, extending over very little more than three sections, but in this limited area there are nearly fifty wells. Some are very deep, one being 2300 feet. The oil is of two qualities;

one very heavy and black in color, the other very much lighter, about 35° B. There are two pipe lines to transport the oil to the railroad. Another district in Fresno that has produced some oil is Kreyenhagen, twenty-two miles southeast of Coalinga. Like Coalinga, it produces two qualities; one green, light, 35° B., and one black and heavy, 14° B. Other districts have been prospected, but they yield little or nothing.

In Kern county we come to the largest field that has yet been discovered. The story of this field reads like a fairy tale. The land was a desert, forbidding, barren, and valueless. The alternate sections of government and railroad lands were not taken up to any extent, for no one thought they were worth taking up. And so strong is prejudice that little of the land was filed on by the residents even after it was demonstrated that it contained petroleum. Most of the developing was done by outsiders and it was they who reaped the reward, and the reward in some cases has been enormous. Land that could have been filed on for nothing or paid for at the rate of \$1.25 or \$2.50 per acre is now worth and is sold for \$1000 to \$6000 per acre, and \$10,000 has been paid. Land which two years ago hardly anyone would take as a gift is now producing an income that is equivalent to 5% on \$40,000,000. And the probabilities are that the yield will be greatly increased. It was in April, 1899, that J. F. Ellwood, having noticed a few bubbles of oil in the water, dug an ordinary well with pick and shovel for seventy-five feet, and then with an auger struck the oil sand. The discovery was first received with indifference, but gradually the knowledge that the field was extensive spread. People collected in Bakersfield in such numbers that it was difficult to get accomodations. And this difficulty still continues. A great number of wells were drilled and many more would have been developed if it had not been for the inability of the prospectors to get men and rigs and piping. Of the large number of wells dug, some are good producers. One-hundred-barrel wells

are not uncommon, and some give more. Many yield little and a number have produced nothing. The yield has now reached about 12,000 barrels a month, and will probably increase greatly. Oil ranges from 9° to 22° and sometimes carries much sand. The transportation is difficult.

Another part of Kern county where petroleum is found is the McKittrick district. Here are large deposits of asphaltum that are worked by the Southern Pacific Railroad. They have built a branch road sixty-five miles long, terminating at Asphaltto. This district contains a few good wells, but many are useless. Some give very large amounts of water. The oil is light, about 33°, and the yield is about 10,000 barrels a month. A third district in Kern county is the Sunset. This has also been worked for asphaltum for nearly ten years. It has lately been developed for oil. Over fifty companies are operating. Some have good wells, as much as one hundred barrels a day, but many are barren. Nearly all are troubled with fine sand that caves in and chokes the wells and also remains in the oil. There is a great lack of water, and what there is is usually salt or alkaline. Most of the oil is heavy, containing 30% to 50% of asphaltum of good quality. The asphaltum is sometimes more valuable than the oil, owing to lack of transportation facilities.

The foregoing are the districts that produce practically all the oil in California. But it has been found in greater or less quantity in almost every county, and also in parts of Oregon, Washington, and British Columbia. Some of the counties in which prospecting has been carried on extensively in addition to the southern counties already mentioned, are San Diego, Santa Clara, San Mateo, San Francisco, Alameda, Contra Costa, Napa, Sonoma, Colusa, Yolo, Mendocino, Humboldt, and Shasta. Some have dug very deep wells. Some in Contra Costa and San Mateo are 1200 feet deep. There is a well in Humboldt, in the Mattole district, 2000 feet in depth. They have all yielded a small amount of oil, frequently of light gravity.

To recapitulate, we find that oil is distributed over this entire western coast, but as yet practically the whole amount produced comes from a few districts in the southern part of the state. The following table, taken from the Report of the State Mining Bureau, will illustrate this:

COUNTY.	1897.		1898.		1899.	
	Product, bbls.	Value.	Product, bbls.	Value.	Product, bbls.	Value.
Fresno	70,140	\$70,840	154,000	\$154,000	439,372	\$439,372
Kern			10,000	10,000	15,000	13,500
Los Angeles....	1,327,011	1,327,011	1,462,871	1,462,871	1,409,356	1,409,356
Orange.....	12,000	12,000	60,000	60,000	108,077	108,077
Santa Barbara	130,136	130,136	132,217	112,549	208,370	191,288
Santa Clara....	4,000	10,000	3,000	6,000	1,500	3,000
Ventura.....	368,282	368,282	427,000	571,000	496,200	496,200
Totals.....	1,911,569	\$1,918,269	2,249,088	\$2,376,420	2,677,875	\$2,660,793

The amount produced in 1900 is much greater than in 1899, but the relative value is less. The increase is chiefly in Kern county.

As to the prospects of obtaining a larger supply, we can get a clearer idea by discussing the origin and genesis of petroleum. It is often supposed that oil exists in the form of underground lakes or pools and that a producing well is one that strikes one of these accumulations. In rare cases this may be so, but practically always we have the same conditions as in the case of water wells—a more or less porous medium, gravel or sand or sandstone, saturated or soaked with oil or water, underlaid and surrounded by an impervious wall of clay or rock, that prevents the escape of the oil or water. In the case of oil, a cap or cover of some impervious medium is also necessary, otherwise the oil will volatilize and escape. We see examples of this in the deposits of asphaltum, which are probably residues of petroleum from which the volatile part has been evaporated. When the porous medium containing the oil is made up of pebbles or very coarse gravel, the interstitial space is very great and such gravel will contain much oil, and a well bored into such a layer will yield large amounts. This is the case in the Russian wells where the oil sand is made up of coarse pebbles. Some of them are tremendous yielders—

50,000 or even 100,000 barrels a day. Where there is coarse gravel the yield is correspondingly reduced but is still very large, as instanced in the Matthews and Mervy wells in Pennsylvania, that have yielded 15,000 barrels a day. Another reason for the large yield of oil in the coarse gravel or pebble wells is that the oil flows easier and more rapidly than in fine sand or sandstone, and can be pumped out more rapidly.

In California most of the oil sand is very fine, and is sometimes cemented into a brittle sandstone. Such wells cannot be very large producers, and as a matter of fact, most California wells yield one to two hundred barrels a day. Some are much larger, one having yielded 3,000 barrels a day, but only for a short time. The fine sand is often troublesome, causing the wells to cave in and choke up. It is frequently pumped up with the oil. Oil is usually accompanied by water, and this water is often salt or alkaline. Ordinarily, owing to the difference in specific gravity, the water will be below the oil. When the permeable strata or oil sands are inclined, it is often a difficult geological problem to determine the most favorable place to bore for the oil; for if the locality be not properly chosen, water or gas or possibly nothing at all is obtained, although oil may be present in considerable quantities. Sometimes the profitable oil sand is very limited in area and surrounded by a large region of impermeable, barren ground. In such a case a well may be bored very close to a producing one and yet remain dry. For example, wells were dug within three hundred feet of the 15,000-barrel Mervy well, previously mentioned, yet not a drop of oil was obtained. On the other hand, a second well may tap the oil sand lower down and draw all the oil from the first well. This has frequently been done. Other things being equal, the larger the number of wells bored in a given area, the quicker the area will be exhausted. The sand contains a given amount, and if a large demand is made upon it the supply will correspondingly soon be exhausted.

And this brings us to the question, How much oil may

be expected from a given region; for example, California? The problem is simple enough in theory; given the area and depth of oil sands and the per cent. of oil carried by the sand, it needs but a couple of multiplications to determine the amount. As to the percentage of oil, estimates vary. In the Allegheny region, where the oil sands are composed of quartz gravel or pebbles the size of beans, the amount is about equal to 1,000 barrels per acre per one foot of sand. In California the percentage has been estimated to be from ten to twenty-five. If we take fifteen per cent. as an average, it would be equivalent to about four hundred and fifty barrels of oil from an acre of oil sand a foot deep. Based on figures such as these, some extravagant estimates have been indulged in as to the amount of oil in California. One enthusiast says that there are 40,000 square miles of territory that almost certainly contains oil, and that the average thickness of the oil sand is 400 feet. On the above assumption there would be stored up in our state 4,608,000,000,000 barrels of oil. The production last year was about 3,000,000 barrels. If this were increased tenfold, the supply would not be exhausted for over 150,000 years. As a matter of fact the entire amount of petroleum produced in California up to the end of 1900 is a little over 15,000,000 barrels. The following table, prepared by Mr. Charles G. Yale for the State Mining Bureau, shows the production by years:

Entire amount of petroleum produced in California:		Barrels.
Previous to 1876		175,000
1876		12,000
1881		100,000
1885		325,000
1892		385,000
1893		470,000
1894		705,000
1895		1,208,000
1896		1,252,000
1897		1,903,411
1898		2,267,000
1899		2,292,000
1900		3,000,000
Total		15,094,411
1901 (estimated)		5,000,000

The supply in a given area is practically a fixed quantity, and will be exhausted sooner or later according to the demand made upon it. If a large number of wells are sunk close together, the field is relatively soon drained. If the strata are inclined, one well may take the supply of another one. This tendency to multiply wells is seen to a great degree in California, especially in Los Angeles, where the derricks are nearly as thick as trees in a forest. There is a certain proportion to be observed between area and the number of wells. If the wells are too far apart, the sand is not thoroughly drained. If too near, there is useless expense. About one well to five acres is supposed to be reasonable, but this, of course, is subject to variation according to circumstances.

The method of drilling wells is exceedingly simple. It was devised in Pennsylvania in the early sixties, during the oil excitement, and with a few modifications has been adopted in every country. A very heavy iron bar with a sharp edge is suspended and allowed to drop by its own weight, lifted and again dropped, the bar being slightly turned each time by twisting the rope. This pounding is continued until a number of feet have been drilled, and then water is admitted and the debris baled out by means of a simple pump. There are, of course, many adjuncts and adaptations, but the principle is the same in all. Ingenious tools have been devised to loosen tools that have stuck or to regain lost tools. Ordinarily the well is cased with iron pipe screwed together. This iron pipe keeps the well from collapsing and also enables the driller to admit or shut off water or oil at any desired level.

Sometimes the oil when struck is under great pressure, and will throw the tools, weighing several hundred pounds, many feet into the air, and a stream of oil will follow that may continue for a long time. Such wells are known as gushers. Their value is usually very great, not only on account of the large quantities of oil, but because there is no cost for pumping. Occasionally a well will spout inter-

mittently, usually due to an accumulation of gas. The pressure will increase until the supply of oil is forced out, sometimes with great velocity. The gas pressure is released and the oil sinks back, to be again forced out. They are in fact oleaginous geysers. Occasionally the flow of oil is so great that it cannot be controlled. Even building earthwork dams at intervals is not always effective, and much of the oil is lost. If this flowing oil takes fire it may make a magnificent spectacle, but often causes much damage, and sometimes loss of life, as exemplified a few months ago at Baku, in Russia.

The wells vary in depth from a few hundred to twenty-five hundred feet. The cost of drilling depends upon the character of the bore and the distance from the base of supplies and the character of the roads. Under the most favorable circumstances, a 1500-foot well can be drilled for \$2,000 and a 2000-foot well for \$2,300, a considerable part of the cost being for the casing. Usually, and particularly in California, the cost is considerably more—two or three or even four times as much. A 650-foot well in the Bakersfield district costs \$2,500, and a 1000-foot well costs \$5,000. But the well once drilled, there is little or no expense.

Having obtained the oil, the next problem is to transport it to market. The easiest way, and the one always used during the first stages of the development of an oil field, is to transport in barrels, usually of a capacity of forty-two gallons. The next is to use tanks, either small wooden ones transported on wagons, or large steel ones, carried on railroad cars. When navigable water is convenient, barges or steamers may be used. The usual capacity of tank cars is 150 barrels. The boat capacity is limited only by the size of the vessel. This latter is an exceedingly cheap method, and oil can be carried long distances at little expense. Some of the oil from Southern California is thus transported, and it has been brought in the same way from Peru, and also across the Atlantic. The simplest way is to transport it by means of pipe lines, and in all the large

fields hundreds or thousands of miles of pipe are employed. It varies in size from two to eight-inch, the six-inch screwed pipe being the most common in the East. Pumping stations are erected at intervals, usually of forty miles. The lighter the oil the easier it flows through pumps and pipes. Very dense oil cannot thus be transported. Very cold weather will thicken the petroleum and may stop the flow. As California oil is usually very dense and heavy, pipe transportation for any distance will be difficult and expensive. This may to some extent be remedied by thinning the oil with some distillate, but it will always be more expensive to use pipe lines for carrying California petroleums than for the Eastern oils, in spite of the warm winter weather. It costs 10 cents a barrel to transport 35° oil through a 3-inch pipe ten miles from the Coalinga district. The railroad charges 42 cents a barrel to carry oil from Bakersfield to San Francisco, with an extra switching charge, making the entire cost of freight about 45 cents a barrel. As the oil is originally worth only about 85 cents to \$1.00 per barrel, transportation is a considerable item. Efforts are now being made to induce the railroad to reduce this tariff.

When the petroleum has been carried to its destination, the next step is to dispose of it. For crude oil the only large use is as fuel. Crude oil in bulk does not burn readily, especially if it is heavy. A special form of burner must be used. The usual method is to inject the oil in a very fine spray by means of steam, and the heated, finely divided particles will burn easily and completely. As the flame is exceedingly hot, it is directed on to brickwork on the bottom of the fire-box, and the boiler heated to a large extent by radiation. The advantages, especially on this coast, of oil over coal are many. It is more convenient to handle, it is cleaner, and it is cheaper. The ease with which the liquid oil is transported is much greater than with solid coal. When properly burned, there is no smoke, or soot, or cinders. There are no ashes, so the boiler tubes do not get

stopped up. Oil heating is particularly desirable for locomotive engines. Ease of loading and firing and absence of cinders, with consequent comfort to passengers, and no danger of setting fire to grainfields or fences, are self-evident advantages. In Russia nearly all the locomotives are thus run. In this state probably all the engines will soon be oil-burners. The cheapness depends partly on the relatively greater economy in handling and partly on the greater heating value as compared to cost. Seven barrels of oil will weigh about a ton. At a cost of \$1.25 per barrel this would be equivalent to \$8.90 per ton; at \$1.50 per barrel, \$10.50 per ton. But the heating value of oil, weight for weight, is greater than that of coal. From a number of experiments we have made in our laboratory, we find the heat value of California oil to be between ten and eleven thousand calories, averaging about ten thousand five hundred. The best coals of this coast average seven to eight thousand calories, and the usual steam coals much less. Comparing the cost of coal and oil as to the theoretical heat value, a ton of oil would be worth six to eight and the coal eight to nine dollars. The actual difference is very much greater than this, as there is much less waste in oil heating. From many actual experiments made under boilers, it has been found that the actual saving is from 25% to 40%. So that coal cannot compete with petroleum at the present prices, nor can it until its cost is reduced to between four and five dollars a ton, whereas it is now between seven and eight dollars a ton. This brings the cost of fuel on this coast to a par with the cost in the East, with its consequent great advantages.

Crude petroleum is used to a very slight extent otherwise than as a fuel, as a mixture for insecticides, and for coarse lubricating. A quantity is also used for gas-making, but it is then no longer petroleum. For all other purposes it must be refined, and this is usually effected by distillation. Crude petroleum is made up of a very large number of products of different boiling points, some

gaseous, some liquid, and some solid. On boiling the oil and condensing the vapors, first the gaseous, then the liquid, and then the solid pass over, a non-volatile residue being left in the still. These distillates and the residue are not simple bodies, but are themselves made up of a number of different bodies, that may to a certain extent be separated by more or less complicated methods. As a rule, no attempt is made to prepare these bodies in a state of chemical purity, but commercial products, fitted for particular purposes, are made, and they are usually mixtures of a large number of bodies. Of these commercial products the most valuable is illuminating oil, known also as kerosene, coal oil, burning naphtha, and by many other names. This is the part which in American oils has a specific gravity of about 0.800-0.840 and a boiling point of about 150° to 250° C. The Russian burning oils have a higher gravity and a lower boiling point. The essentials of a good illuminating coal oil are simplicity and homogeneity of composition and small carbon contents, low specific gravity, low viscosity, and high boiling point. An oil of high carbon contents and complex structure will give a smoky flame and disagreeable odor. If the gravity and viscosity are high, then it will not flow readily through the wick. If it contains low boiling constituents even to a small extent, it is liable to give off inflammable and explosive vapors when the oil is only slightly heated. Pennsylvania petroleum yields a large quantity of distillate that possesses these desirable qualities to a great degree, while from Russian and California oils only a small amount of such distillate can be obtained, and even this small amount possesses certain defects. Hence the greater value of the Pennsylvania oils. Of course it is possible to construct lamps to burn this inferior oil satisfactorily, and it may also be possible to devise a chemical method for improving the oil, but as yet it has not been done. The great mass of California distillates is used to mix with Pennsylvania oil and give a cheaper grade. Of course, from any crude oil, by repeated

distillation and treatment, some desirable burning oil can be made, but a large percentage is what is profitable. Various instruments and tests have been devised for testing the quality of an illuminating oil to determine its safety and value. All the European countries and many of our states have passed laws defining the requirements and regulating the sale of oil, but as yet California has no such law. An attempt to enact one at the last session of the Legislature met with failure.

The portions of the distillate boiling at lower temperatures than the illuminating oils are also of considerable commercial value. They are known as gasolenes, rhigolenes, ligoines, benzenes, petroleum spirits, and by many other names. They are used principally for solvents of fats, oils, varnishes, paints, etc., for gas engines, gas machines, ice-making machines, and for a great number of other purposes. The higher boiling portions of the distillate are employed chiefly as lubricants, and any desired quality can be made. Still higher boiling portions that condense to solids or semi-solids are of considerable commercial value. Such are the vaselines and paraffines. Here, again, Pennsylvania oils are superior, yielding larger amounts and usually a better quality of the products. On the other hand, California petroleums are superior to Pennsylvania oils, inasmuch as they contain asphaltum, sometimes to a very large extent. This is left in the retort after distilling off the other constituents. It is of great purity, being free from the sand and earthy matter that make up such a large part of natural asphaltums. These latter often contain 50% or more of impurities, which means a great deal when we consider freights.

Simple distillation is not sufficient to prepare the above substances so that they can be satisfactorily used. They must be subjected to a more or less complicated process of purification. This usually consists in distilling, washing with acid (usually sulphuric), alkali (usually soda or ammonia), and water. Sometimes these distillates are sprayed

through air to remove disagreeable-smelling constituents. Some of the oils are bleached, either by the sun or by chemical reagents. Sometimes they are filtered through charcoal or boneblack. In the case of solids recrystallization is usually resorted to, that is, the body, such as paraffine, is dissolved in some of the low boiling constituents, usually naphtha, and the solution cooled in ice and salt. The paraffine crystallizes out. These crystals are put in bags and the excess of solvent squeezed out, and the process repeated until the product is sufficiently pure. The white solid substance obtained from Russian petroleum is known as alboline, and is not identical chemically with paraffine.

The process of refining is mechanically quite simple. The oil is distilled from large iron or steel vessels, shaped like steam boilers, holding usually about twelve hundred barrels. Steam heat is sometimes used at first, or they may be heated directly with a burner. The gases that are at first given off or that result from the decomposition of the oil by high temperatures, are often utilized to heat the stills. The vapors are condensed by passing through long iron tubes immersed in cold water. If it is desired to save the very lowest boiling fractions, they must be condensed with ice and salt. The remainder of the oil is then distilled into three fractions:

First having a gravity of 65° to 58° B.

Second having a gravity of 58° to 38°.

Third having a gravity of 38° to 25°.

The first fraction is distilled into gasolene and A.B.C. naphtha. The second is distilled into various grades of kerosene and washed and purified as heretofore indicated. The third, known as paraffine oil, is cooled and the paraffine separated out. This is recrystallized several times as already explained. The percentage of these various constituents varies according to locality, and particularly is this so in California. Eastern oils contain from 10 to 30% of light oils, 50 to 75% of kerosene, and 1 to 35% of heavy oils containing paraffine. Russian oils contain 1-50% of

light oils, 10-40% of kerosene, 40-85% of heavy oils containing paraffine. California oils contain 1-30% of light oils, 5-50% of kerosene, 10-40% of heavy oils, 1-40% of asphaltum. To a considerable extent the proportions can be varied by varying the time and temperature of distillations, whereby the constituents are more or less decomposed. This operation is technically known as crocking, and to prevent this the distillation is sometimes conducted in a vacuum, whereby high temperatures are avoided. This mechanical and chemical treatment of course adds greatly to the cost of the oil. If we add packing, freight, and profits of distillers and middlemen, the consumer may have to pay as much as twenty cents a gallon for a refined oil, when the crude oil at the well is sold for less than two cents a gallon. But even twenty cents a gallon is a great reduction from the price in 1840, when it sold for from ten to twelve dollars a gallon. In California until comparatively recently, there were only three refineries—one at Newhall, belonging to the California Star Oil Co.; one at Alameda Point, belonging to the Pacific Coast Oil Co.; and one at Oleum, in Contra Costa County, belonging to the Union Oil Co., which one was founded at Santa Paula, in Ventura County. Now there are ten, and the number will soon be increased. One of the greatest dangers in an oil refinery is fire, and many disastrous losses have occurred in the burning of various works. But it is extraordinary, considering the inflammable nature of the product, that comparatively there are so few conflagrations.

Petroleum, chemically considered, is a liquid of varying, usually very complex, composition. The color varies from clear water white, through various shades of yellow, amber, red, and brown, to black. Its viscosity varies from great mobility to a thick tarlike mass. The specific gravity likewise varies, the extremes being from 0.771 to 1.020. The refractive index and coefficient of expansion are high; the specific heat is low; but, as in the case of color and specific gravity, there is great variation in the oils from different

places. Usually oils from the same locality resemble one another, but not always. In California especially the variation may be very great in oils from contiguous territories.

This great variation in physical properties is, of course, dependent on differences in chemical composition. Petroleums from different regions are totally different in their structure. The Pennsylvania oils are the simplest, Russian and California oils much more complex. But the simplicity is only relative. From Pennsylvania oils scores of substances may be obtained, and many of them are prepared on a commercial scale. The essential difference between Pennsylvania and Russian and California oils is that the former, viz., Pennsylvania, are made up mainly of what are known as methane derivatives or paraffines, while Russian and California oils contain relatively small amounts of these, the largest proportions being unsaturated bodies, olefines, benzenes, and naphtenes. The proportions of nitrogen and sulphur are also large in California oils.

Comparatively little has been done in a scientific way on petroleums, and particularly is this true in the case of California oils. It offers a wide field for investigation, especially as it is no doubt true that many valuable chemical products other than fuel and light-producing bodies are contained in the oil or may be made therefrom. From one point of view, combustion is a most wasteful action. The chemist's instinct is to conserve the products that come under his hands and to convert them into others that are of greater worth. In petroleum he has a most valuable raw material. There is little doubt but that in the future a large proportion, if not all, of the natural oil will be converted into products useful to man, and not annihilated in boiler furnaces. Mechanical, light, and heat energy should be derived directly from water and sun power, and leave the stored up materials—stored up probably at a cost of centuries upon centuries of time—to be used for material purposes. Relatively there is not much of these products,

and, once destroyed, they will not be regenerated for ages. We are wasting our heritage.

There is one question we have not touched on, and that is the origin of petroleum. How were these immense subterranean deposits of oil stored up? Where did they come from? Were they formed *in situ*, or were they derived from other strata? These questions have been discussed for a very long time. Redwood gives a brief history of the subject in his work on petroleum, from which some of the following facts are collected. Bacon indulges in some vague speculations regarding the origin of bitumen, and says it is formed from a mixture of a fiery and a watery substance, and that the flame attracts the naphtha of Babylon afar off. Bergmann, the Swedish chemist, says that petroleum is water combined by means of acid with the principle of inflammability. Macquer, a French scientist of the eighteenth century, regards petroleum as being formed from bitumen, which he thought was derived from the resinous and oily parts of trees, modified by long burying in the earth. Hatchett in 1798 wrote an extended treatise on mineral oil, and classified the various forms of petroleum, bitumen, asphaltum, mineral tars, and naphthas. He believed that all these bodies were derived from the resinous principle of wood. Several other chemists of the eighteenth century examined specimens of crude petroleum and expressed opinions as to its relations with other bodies. In 1817 Vanquelin, the celebrated French chemist, made a report on Italian petroleum, which was then used to light street lamps in some Italian cities. Nothing further seems to have been published until 1833, when Professor Silliman, Sr., described the petroleum of Pennsylvania. In 1855 Professor Silliman, Jr., wrote an extended account of these same oils. Since the excitement of 1860 many investigations into the nature of petroleum have been undertaken, and the literature of the subject is very extensive.

The modern theories in regard to the origin of petroleum may be divided into two classes, inorganic and organic.

This latter may be divided into two classes, derivation from plants and derivation from animals. The originator of the first theory, viz., derivation from inorganic sources, was Berthelot, the most brilliant and famous chemist of France. He showed experimentally that water, containing carbonic acid, or earthy carbonates, brought in contact with alkali metals at high temperatures, was decomposed, and so-called acetyties were formed. These, again reacting with water, evolved hydrocarbons that were contained in petroleum. The discoveries of his colleague and compatriot, Moissan, of the carbides, strengthened the theory. Moissan prepared in his electric furnace combinations of metals and carbon, the so-called carbides, that in contact with water would evolve all the various hydrocarbons that are present in petroleum. Berthelot believes that these reactions are going on in the interior of the earth, a molten interior made up of metals. Carbonic acid comes in contact with these metals, is decomposed, and is converted into carbides; these in turn react with water, producing petroleum, that is distilled and lodged in porous strata of the earth. Many chemists and geologists support this or a slightly modified view, among them Maquemie, Byasson, Cloez, Ross, Sokoloff, Coquand, Graburske, Hitchcock, and Mendeljoff. We have not time to enter into the various arguments advanced by those scientists in support of their view and can only say that it explains many of the observed facts, but not all.

The supporters of the organic origin of petroleum are very numerous. Some believe that petroleum is formed by intense heating of deeply buried vegetable matter analogous to coal, or lignite, and a subsequent distillation into superincumbent strata. Others, that it is due to a slow decay of minute vegetable forms in limestones at a very moderate heat. Others, that it is the result of decay under water, of vegetable matter, analogous to the action now going on in marshes. Others, that shales or limestones containing animal remains, have been subjected to heat,

and the petroleum distilled off, to condense in other strata. Others maintain that it is the remains of large sea animals that have accumulated for ages, become covered with deposits and afterwards heated, whereby petroleum is distilled off. All these theories have certain observed facts to support them and many have been strengthened by experimental evidence. For example, Engler, a German chemist, distilled about a thousand pounds of fish oil in a closed retort, under a pressure of four to ten atmospheres, and obtained about sixty pounds of a distillate which contained many of the natural constituents of natural petroleum and could be fracturated into a kerosene that could not be distinguished from the genuine product. Many other similar experiments have been made, but usually not with such satisfactory results.

The weight of evidence seems to be in favor of an organic origin for the petroleums and that the different petroleums are formed under different conditions and from different sources. Oils occur in formations of all ages, from Silurian to Miocene. As a rule the oil from the oldest rocks is simplest in composition, while those from newer formations are more complex and contain nitrogen and sulphur, the characteristic elements of animals. In other words, in early geological times when plant life alone existed, the organic matter accumulated in plant forms and was decomposed and petroleum of the Pennsylvania type resulted. In later periods, when animal life made its appearance, similar decomposition went on and a petroleum was formed, but of different composition. This is apparently the case in California. These plant and animal organisms were minute and probably lived in water. The accumulations of their bodies on the bottom of the seas became covered with clays and sands and were buried for ages, and it is from these organisms that the petroleum resulted. The oils in many cases were subjected to secondary distillation, and gases, light oils, and heavy residuums resulted. The question is one of the greatest interest, but we have not the time to develop it

fully; but I believe that in California we have a most promising field for determining the origin of its petroleum. We have made some experiments on this line in our laboratory. We distilled some California shale that contained not a trace of petroleum and obtained about twenty-five per cent. of an oil that appears to resemble petroleum. The shale was filled with the remains of small shell fish, and it is from these that the oil was formed. We shall continue these experiments and hope to obtain some conclusive results.

The question is often asked, Is the oil industry of California a legitimate business, with good future prospects, or is it a sporadic affair that after a few years will die out and leave nothing but decaying derricks and abandoned wells? No one can predict the future with absolute certainty, but there seems to be no doubt but that for several years at least a large supply of oil will be obtained. Until the Kern county fields were discovered, the outlook was not very promising. True, there was considerable oil produced, but the fields were limited in area and the sands not very thick. The product of Los Angeles county, after eight years flow, began to decline, and it was but a question of time when the wells would be exhausted. But the San Joaquin valley seems to be an enormous reservoir of oil, and future prospecting will no doubt show equally large deposits as have been found in the neighborhood of Kern river. The Sacramento valley has been but little exploited. The flow of gas in some counties suggests that oil may not be far off. There will almost certainly be a supply for many years. In the East, wells have been practically pumped for twenty and thirty years. It is merely a question of the size of the reservoir. If the oil sands are thick enough and the wells are not too close together, there is no reason why California wells should not be profitable for many years, as they are in the East.

The other essential of business success, viz., Will there be a demand for all the oil that can be produced? can also be answered in the affirmative. If used for no other pur-

pose than fuel, there will be demands far in excess of the present supply, if it can be demonstrated that the supply will be constant. The amount of coal consumed in California alone is more than one and three quarters million tons, equivalent to nearly eleven million barrels of oil, and we have the whole West for a market, for oil can easily replace coal, other things being equal. And the oil can be produced cheaply. Practically the only cost is that of the land and the digging of the well. Pumping costs but little, one or two cents a barrel. Of course transportation is now a considerable item, but this will be remedied. There is practically no doubt but that the oil industry will be a flourishing one for several years. All is not gold that glitters, and not all of the companies that have been organized will pay three per cent. a month. Nor will there be many individuals who will make a million in a year. But in the aggregate the oil industry means much to California. It has added to its wealth, it has enabled the manufacturer to get his power more conveniently and cheaper, it has added to the comfort of the people, and it has stimulated enterprise and attracted capital. The great question is, Will it develop and will it last? It is probably safe to say that it will do both.

THE ECONOMICS OF DEMOCRACY.*

By FRANK W. AITKEN.

οὐθρωπος φύσει πολιτικὸν ζῶον—

—"One of the truths in which we go on perceiving more significance the more our knowledge increases."—SIR FREDERICK POLLOCK.†

The five questions propounded by Dr. Stallard in this competition practically amount to one: "What economic measures should a government adopt to secure its citizens equality in life, liberty, and the pursuit of happiness?" We immediately ask: "Why should a government adopt any means for this purpose? Is it within its functions to do so, or is it not a violation of individual liberty? And even if such action is permissible, is it at all certain that equality in these respects is desirable?" To these preliminary questions, which must be answered before the consideration of the specific means is taken up, the Declaration of Independence suggests an answer. It is that governments are in fact instituted for the very purpose of securing these rights equally to all. We are to examine the sufficiency of this answer as a justification of governmental activity for the purposes suggested. We shall try to show that it does indeed furnish such a justification, though not in the sense in which the assertions in the Declaration are usually understood.

We might well consider the preliminary questions from

* Stallard prize essay. October 1, 1900.

† Fortnightly Review, August, 1882; p. 219.

the point of view here presented, first discussing the functions of government and the rights of the individual, to see in how far governments should interfere at all in economic affairs, and then taking up the doctrine of equality to see in how far government action should be directed to that end. This would best express the logical connection of the parts of the subject. But because of the progressive nature of the particular statements in the Declaration of Independence here to be considered, it will probably be more convenient to discuss the various topics practically in the order in which they there occur; that is, as they are arranged in the five questions presented.

1.—*What meaning should be attached to the term "rights of man" ? If the phrase is metaphorical, what should be its literal statement ?*

The Declaration of Independence states that "all men" are endowed with "certain rights," and our first question is concerned with this statement. What, then, is meant by a right ?

Great controversy has raged concerning this subject. On the one side it has been contended that rights are something inherent in men, and inseparable from them; that by the mere fact of his existence a man has an absolute "right" to his life, his liberty, and the pursuit of happiness. His rights, therefore, are said to be independent of his membership in any community, and prior to any claims of the state.

On the other hand it is argued that all right originates in the state, and that no one has any rights as against the state. The contradiction is complete.

The first thing which we notice about rights is that they are in no sense absolute, as a matter of fact. The right to life may be a "natural right," but nevertheless people die from natural causes without our thinking it a "natural wrong." Society, too, punishes wrong-doers by imprisonment—a clear violation of the right to liberty, if that be absolute,—and by death—a similar violation of the right to

life, if that be absolute. Rights are held conditionally; we know that under certain circumstances the state may disregard them, we being said to have "forfeited" them.

Of what avail, indeed, are our rights if others may declare them forfeited? It has been said, in derision, that natural rights are not rights at all, but merely natural desires. Here, however, is the real strength of the idea of rights. It is precisely because people universally desire life, liberty, and freedom to pursue happiness, for themselves, that they sympathize in and recognize others' claims to them; and this is what makes them rights. Professor T. H. Holland says right is "the name given to the advantage a man has when he is so circumstanced that a general feeling of approval, or at least of acquiescence, results when he does or abstains from doing certain acts."^{*}

A right, then, is a recognized claim; and a natural right is such a recognition based on and necessitated by the very nature of man. "Clearly," says Herbert Spencer, "the conception of natural rights originates in the truth that if life is justifiable there must be a justification for the performance of acts essential to its preservation; and, therefore, a justification for those liberties and claims which make such acts possible."[†]

Being essentially a recognition, rights are social in nature: there must be others to recognize them, and so there never could have been any rights before the formation of a "social compact." Since they are based on the nature of man, and require the recognition of others, rights are not the mere casual and unregulated claims of actual individuals, existing independently of others and of the state. At the same time they are individual in their nature, and not merely the arbitrary creation of the state alone, to be granted or withheld at its pleasure. As Spencer says, it is absurd to think of a people creating rights, which it had not before, by the process of creating a government in

^{*} Jurisprudence, Ch. VII.

[†] The Man vs. The State, Herbert Spencer; p. 95.

order to create them; or to treat an individual as having a share in rights *qua* member of the people while in his private capacity he has none. "If it is a plain fact," says Professor Bosanquet in his recent volume on the "Philosophical Theory of the State," "that 'a right' can only be recognized by a society, it is no less plain that it can only be real in an individual. If individual claims, apart from social adjustment, are arbitrary, yet social recognitions, apart from individual qualities and relations, are meaningless."*

Such is the meaning of this simple phrase. It is indeed metaphorical, and its literal statement would be,—claims, founded on individual relationships, which the members of society are bound by their own nature to recognize.

2.—*Are all men created equal with respect to the rights asserted by the Declaration of Independence to be inalienable?*

Bearing in mind the meaning already given to the word rights, we see that this question asks, in substance, "Is society bound, in consistency, to give equal recognition to the claims of all men to life, liberty, and the pursuit of happiness?"

What meaning, then, is to be attached to the word "equal," used in this connection? There is of course no question that men are not created equal, physically or mentally, and no one would say that the authors of the Declaration meant that they were. They did not even mean that all men were equal in their rights to political activity; for not one-half of the adult male citizens of the country were entitled to vote when, a few years later, our Constitution was adopted. It has been pointed out time and time again that the only equality they cared about was equality in civil rights—equality of treatment before the law. The doctrines of the necessity of consent to government, of the right to overthrow oppressive governments, and of resistance to arbitrary treatment, as embodied in the Declaration of Independence, and in the Magna Charta long before, arose from opposition to hereditary privilege,—

*The Philosophical Theory of the State, Bernard Bosanquet; p. 71.

to any fixed status from which no escape was possible. These doctrines were based on a feeling of individual worth; we may see both the justification and the limits of equality, by an analysis of the idea of individuality.

Professor Seth quotes Sir Henry Maine's well-known statements that "the movement of the progressive societies has hitherto been the movement from Status to Contract"/* and that "the individual has been steadily substituted for the family, as the unit of which the civil laws take account,"* and says: "The fundamental law of moral progress, whether in the race or in the individual, may be stated in essentially the same form. . . . Progress is, in sum and substance, the progressive discovery of the individual."† This principle is borne out by history. In early and undeveloped tribes, the individual is unnoticed; he is merely a part of a solid, compact whole. In the Grecian and Roman states there was some recognition of persons as persons, in whom certain rights were recognized, but the individual was merged in the family—family estates were inalienable in Greece, and the "son of the family" was almost a slave in Rome. So in regard to the state. A few days ago robbers forced a county treasurer, at the point of a pistol, to open the vault in which the county funds were kept; no such thing could ever have happened in Greece or Rome, where every robber knew instinctively that a public officer would readily lay down his life for the sake of the state. The individual was always subordinate. Christianity, however, taught that all men were sons of God, and of immortal worth, and consequently brothers in origin and in destiny; the implication that all men were equal in the sight of God brought a gradual increase in the recognition of individual worth in actual life. The Protestant Reformation further strengthened this recognition through its express assertion of the supreme value of the individual conscience.

* *Ancient Law*, Sir Henry Maine; pp. 165, 163, 3d Am. Ed.

† *Ethical Principles*, James Seth; 323.

Such are the influences leading to the doctrines enunciated in France in 1762 by Rousseau and in America in 1776 by the Declaration of Independence.

The belief in equality, then, is based on the feeling of individual worth, and amounts to this—all men are to be treated as individuals; each is to be considered in and for himself alone, and treated as he himself deserves. In short, each is to make of himself as much as he can, and not suffer from any fault not his own. This is the only inalienable right; it is so because by his own nature man must claim it for himself and recognize it in others.

There is another side to this progress spoken of by Professor Seth. Along with the progressive discovery of the individual has gone the progressive development of the individual. It is because the members of an advanced society are in fact persons of individual worth that they recognize the demands of similar persons about them. "Savagery is uniformity," says Professor Harris; a savage tribe, he points out, is merely a horde of men, women, and children, who think alike, act alike, and do the same work. "The rudimentary societies are characterized by the likeness of equality; the developed societies are characterized by the unlikeness of inequality or variety."* The French sociologist Le Bon sees anatomical evidence of this in the varying capacities of human skulls. "It is found," he says, "that the races in which the volume of the skull presents the greatest individual variations are the most highly civilized races. In proportion as a race grows more civilized, the skulls of the individuals become more and more differentiated."† We shall see later that this differentiation of individuals is an essential condition of human progress; at present it is sufficient to note that it is because the members of advanced societies are themselves persons of individual worth that they recognize the individuality of others, and that it is only because they are persons of

* Inequality and Progress, George Harris; p. 75.

† The Psychology of Peoples, Gustave Le Bon; p. 48.

individual worth that they can claim such recognition for themselves.

A man's right to life, liberty, and the pursuit of happiness, then, is founded upon his individuality and is conditioned by the use he makes of it. In concrete circumstances men are usually regarded as having unequal rights, as in the case of an inferior and a superior race in the same territory. Such a superior race stands for better conditions—for more individuality—and on this basis has a "higher right." No judge, of course, is present, to decide as to this higher right, but the right exists, in the certainty of recognition by the public opinion of the times to come. It is to be noted that no race is absolutely superior to another—superior in all respects. Each race, like each individual, is regarded for itself alone, in accordance with the circumstances of the particular case, and this is the real equality. The English subdue other races just as they themselves would give way before a higher civilization; the savage defers to Englishmen just as some Englishmen defer to others and all defer to the law. In every case the lower principle yields before the higher one, and this is equality—like treatment under like circumstances. All men are equal in having a right to be treated as they deserve; but it by no means follows that all men deserve to be treated alike. That some men and some races are inferior to others in ability, in potentiality, in significance, is an undeniable fact; what is required is not that each shall be allowed to make of himself as much as every one else, and no more, but that each shall be allowed to make of himself as much as he can.

All men, then, are equally entitled to life, liberty, and the pursuit of happiness; there should be no hereditary or other fixed restrictions or privileges. In each case the right is conditioned upon one's proper use of his individuality—the criminal suffers because of his improper use of his,—and on the necessity of conforming to higher principles—as in the case of inferior races and of various kinds of "state interference."

3.—*What are the economic conditions upon which the enjoyment of these inalienable rights depends?*

We have seen that the inalienable rights amount to one's being allowed to make as much of his life as he can. Economically, this involves, not equality of possession, but equivalence, in each case, of merit and reward. If each is to reach an importance equal to his deserts, however, there must be perfect economic mobility. One hindrance to this has always been, of course, the hereditary transmission of privilege; this is contrary to the idea of individuality. But, plainly, equality in the sense that each is to be regarded for himself alone—that there shall be no hereditary privilege—does not exclude hereditary inequality, as, for instance, of ability; and the essence of the idea is that inequality of importance is to be determined by inequality of ability alone. One exception to this is in the case of hereditary transmission of property. Inherited wealth gives an advantage, of course; but it is allowed because the possession of property is involved in the family relation, and the principle of the family is higher than the mere abstract principle of equality. But while a father can give his children wealth he cannot properly give them privilege, which is not so intimately bound up with the family and need not be exempted from the general rule.

The idea of individuality, then, on which the right of equality is based, requires economic mobility in the sense of the absence of any inertia or friction retarding change from one economic condition to another. There must be freedom for merit to find its proper place—for incompetence to lose its wealth and ability to overcome its poverty, without being hampered by artificial distinctions. But economic freedom, as usually understood,—that is, freedom of competition—is not sufficient to produce this sort of mobility. Men may be perfectly free from outside interference as regards their buying and selling, and still have no chance to assume their proper places. The advantage in a bargain between a rich man and a poor one is always on the

side of capital. "The ownership of capital," says Professor Giddings, "is the best known lubricator of social friction, and when skilfully used, an energetic coercive force."^{*} Again, poverty is cumulative. It makes increasingly difficult the acquisition of the skill and knowledge that are necessary to advancement.

Freedom of competition essentially fails to apportion reward according to desert. Abstractly considered, it may be true that (except for the economic friction already considered) the rewards of industry vary according to the value of the work done—that the man who does work ten times as important as another receives ten times as much in return. But it is seldom noticed that his reward is worth much more than ten times as much to him as the other is to the one who receives it. It is wholly a question of surplus, so far as bettering one's economic condition is concerned. It has been pointed out by a German economist[†] that as income increases the amount spent for the necessities of life, while increasing in absolute amount, becomes a smaller proportion of the whole; the rich man has a disproportionate share of his income left over to use in bettering his condition. "To him that hath it shall be given." This prevents a proper economic mobility; if all a man's time and energy are absorbed in merely keeping alive, it can hardly be said that he is free to take his proper place in the economic hierarchy. The great disproportion in surplus rewards makes poverty practically a status, and as such inconsistent with the principle of equality.

The economic condition, then, required for a proper enjoyment of the rights of life, liberty, and the pursuit of happiness is perfect mobility, by which is implied, among other things, the absence of anything in the nature of a status or permanent disability.

4.—Is it the function of governments to secure these economic conditions equally for all men?

^{*} Democracy and Empire, F. H. Giddings; p. 105.

[†] Dr. Engel. See Economics, A. T. Hadley; § 359.

The functions of government are intimately bound up with its origin; and here we meet with directly contradictory theories. On one side it is argued, by those who hold to the idea of abstract right, that governments exist for certain narrowly defined purposes and cannot properly exceed them. Thus they limit the functions of government very strictly, in the interest of "individual liberty" and "private right," the extreme individualists denying the right of the state to do anything except enforce contracts and keep the peace. It is hard to see why they should make these exceptions, or how they can justify them. The enforcement of a contract, for instance, is an "interference" with "individual liberty," and can only be justified by reference to other principles, which are equally applicable to various other kinds of state action. If the state can enforce contracts because by so doing it furthers public interests, why can it not establish schools for the same reason? The unfailing answer of individualists to such questions as the last is, "Because it is not one of the purposes for which the state exists." It used to be thought that states and societies had originated in a compact entered into by their various members; but while this view would account for the narrow limiting of purposes "for which the state was formed," it would not show that none had since been added by common consent—by later contracts, if you please. But it is now recognized that the social compact is utterly imaginary. The historians and anthropologists tell us that their researches give no indication of a non-social condition; the publicists say that rights could never have existed except in society; the philosophers declare that the formation of a state by non-social beings is a logical absurdity; and the sociologists deny that man could ever have lived except in society.

The opposite theory, which derives all rights from governments and grants them unlimited powers, is equally unfounded. As we saw in dealing with this subject of rights before, it is absurd to think of a government granting

its citizens rights which they had not (even in the form of claims as yet unrecognized) before, or possessing, itself, any rights at all independent of the people in and through whom it exists.

In truth society and the state are natural growths; they are not entered into consciously, on the one hand, nor are they forced upon individuals willy-nilly, on the other. Sir Frederick Pollock has said that no saying in Greek literature is so well worn as Aristotle's dictum that man is "a political animal," and that no saying has worn so well.* The Greek contains much more than we imply by the mere words "political animal." In accordance with Aristotle's idea that the "real nature" (*φύσις*) of a thing was "what it was when completely developed," *φύει πολιτικὸν ζῶον* means "a creature reaching his true development in the life of the citizen" (*πόλις*, city). There we have a complete theory implied; that the state exists because in it alone man can develop properly. Professor Bosanquet expresses the idea well. "In it," he says, "or by its help, we find at once discipline and expansion, the transfiguration of partial impulses, and something to do and care for, such as the nature of a human self demands. If, that is to say, you start with a human being as he is in fact, and try to devise what will furnish him with an outlet and a stable purpose capable of doing justice to his capacities—a satisfying object of life—you will be driven on by the necessity of the facts at least as far as the state."† To put it shortly, society results from the very nature of man. Society, rather than the state, is here referred to by Bosanquet. As the terms will be used here, by a "state" will be meant a society politically organized; by a "government" that portion of the state to which political power is temporarily delegated for the purpose of carrying on its functions.

The position here taken is that society exists because of the very nature of man. Human beings are not

* Fortnightly Review; August, 1882.

† Philos. Theory of the State, p. 150.

mere isolated and unrelated atoms independent of and unconcerned with each other: they are social in their nature and must inevitably live their lives in company with and in dependence upon each other, if they are to obtain any fullness or completeness of living from them at all. The hermit's life, if indeed it be possible, is inexpressibly thin and empty. And as a matter of fact men do habitually live in groups; they have always recognized that life is better when so lived.

Societies are of various kinds. Savages associate in tribes held together by military and economic and usually by family bonds; civilized men, besides their various "political societies"—*i. e.*, those on which states are based—organize themselves into any number of minor "societies" for particular purposes, *e. g.* churches, "social clubs," card clubs, art associations, cycle clubs, charity societies, etc., each characterized, in the words of Professor Giddings, by the likemindedness of its members with respect to the object or purpose for which it exists. The same characteristic, we find, underlies a "political society," which is included under Professor Giddings' definition of a society as "Any number of likeminded individuals, who know and enjoy their likemindedness, and are therefore able to work together for common ends."*

The basis of society, in the sense in which we have been considering it, is that its members are alike in recognizing that they can live better together than they can alone. Consequently, a society is justified in doing whatever results in a better life for its members. Actions that are for "the public good" are justified, and those that are not for the public good are not justified, because the state itself originates in concern for the good of its members.

The state and government are essentially devices for using the full power of the society to attain its ends. Though society is a natural and unconscious growth, governments may properly be regarded as "instituted," as

* *Democracy and Empire*, p. 51.

the Declaration of Independence says; and whether instituted or not, they may properly be thought of as existing "to secure" "inalienable rights." That is, the purpose of government is to bring into operation the whole force of the society when a right which society recognizes is denied by some individual. "The whole purpose of a law," says Professor Holland in his "Jurisprudence," "is to announce in what cases that objective support" (*i. e.*, the support of the physical force of the society) "will be granted, and the manner in which it may be obtained. In other words, law exists . . . for the definition and protection of rights."* Government exists for the same purpose. And whenever a society may legitimately act in a certain way, it may properly proceed by means of state action (government action), since the government is the only means at the command of society for using its whole force effectively. Government being the only means by which the whole society, as organized in the state, performs its functions, whatever may be properly done by a society may properly be done by the government. State action, then, is justified when it is for the real good of the society.

Of course there is never any objection to state action when the end in view consists of an obvious good to all alike. But when a public action benefits particularly one portion of the society and the cost is borne particularly by another portion, the justice of the proceeding is denied. But, since each person finds himself in a society because it can make his life better and since in each case it does actually make it better, he cannot complain if it uses its power for the purpose of making others' lives better, or even if, in so doing, it interferes somewhat with his individual caprice.

The objection to state action—"state interference," it is called—proceeds upon a totally erroneous assumption; there is no necessary antagonism between state action and individual liberty, as is usually supposed. The view which makes men mere abstract individuals to be jealously pre-

* Chap. VII.

served from aggression by others, and government a mere means of preventing such aggression, is essentially narrow and incomplete. According to this view abstract liberty, or freedom from outside restraint, is of the greatest importance, and any infringement upon it is necessarily evil. Government, however, is looked on as on the whole beneficial, and preservative of individual liberty. Now this is a manifest contradiction, if liberty is merely the abstract thing it is usually considered, for we cannot increase the total sum of liberty by decreasing the portion of each person. If a man does indeed derive benefit from being a member of a society, we cannot say that any action which is fundamental in a society is in itself otherwise than beneficial. And if the very nature of man requires him to be a member of a society in order to make the most of his life, that which is fundamentally involved in the action of a society cannot be in itself narrowing.

The abstract idea of liberty is fundamentally self-contradictory. Under it the state cannot be justified even as a mere association for the enforcement of contracts and the securing of internal order; for to deny one the right to break his contracts at will, and to conduct himself personally as he may see fit, are flagrant violations of "individual liberty," and can only be justified on ulterior considerations of "right," of "public good," or of "implied consent." Thus at the very start the only escape from anarchy is in the adoption of other principles. Further, government being granted as possible, for the sake of the argument, the principle cannot furnish any justification whatever for the coercion of a minority—even of one member—by a majority; such a proceeding is plainly a violation of "individual right," and has to be justified on another ground, namely, that the consent of the coerced members is implied in their previous conduct, or in the fact that the action is for the public good (which is only another way for saying consent is implied). In its practical application the doctrine has to fall back on the idea that certain things are implied in

man's nature. A crucial case is given by Bosanquet—a man's voluntary sale of his liberty. "A man may contract to become a slave, but no civilized government will enforce his contract at law, and the ultimate reason for the refusal is, as Mill in effect points out, that man's nature is to exercise will—to have liberty—and a resolution to divest himself of this capacity must be taken as *ipso facto* void, by contradicting the very essence of humanity."* So, no government will recognize a man's consent to be killed, and suicide is universally frowned upon, in spite of a man's individual liberty to do as he pleases with his own; and the reason can only be the one Bosanquet indicates—his inherent nature. Mill supplies another instance: a man who wishes to go out on an unsafe bridge is properly restrained because he cannot be supposed really to wish his own death.† That is to say, his abstract right to do as he pleases is subjected to the higher principles of his own nature.

But it is not man's nature to demand that he be "let alone;" men are not mere isolated individuals, or atoms. It is his nature to act with others; to rely on others; to help others—in short, to be social. The very existence of society attests this. And just as a man's real nature may be appealed to as a justification for interfering when he wishes to place himself in danger, or sell his liberty or his life, so may it be appealed to when social action is opposed; a man is himself only in a society, and so he cannot really be opposed to anything which is for the benefit of the society. Since man's real nature is to be social, it is absurd to think of men as mere unrelated individuals, to be left to themselves as much as possible; since a man obtains his real development only in a society it is essentially false to speak of state action as a limitation on individual liberty, or as necessarily contrary to his best interests.

It must not be thought that there are no limits to state-action; but these limits are not to be found in any notions

* Philos. Theory of State, p. 118. Liberty, J. S. Mill; Ch. v.

† Philos. Theory of State, p. 69.

of abstract liberty, but rather in the idea of society itself. Since the purpose of social and state action is the public good, no action is justified which is productive of great actual harm, even if this be to but one person; there must always be a reasonable relation between sacrifice and gain. No absolute limits can be assigned; we cannot say just how far respect for the individual is to go—even the punishment meted out to the criminal is in accordance with his own essential beliefs as a reasonable social being. But in general it may be said that nothing may be done against the individual's "real will" (taking this in the sense in which it is used by Mill in his illustration of the man and the bridge)—nothing which his essential ideas as a social being would not sanction. Otherwise that recognition which constitutes right will not be obtained. This, of course, leaves the extent of state functions rather vague; but definition in such things is always impossible—it is always necessary, in other cases as well as in this, to depend upon "*bona fides*," since we cannot lay down unchanging rules for a world of change.

But in one regard the functions of the state are quite limited. And properly the limitation grows out of its own nature—out of the necessity of advancing the "good life." The "good life" is individual as well as social; it involves individual characteristics and individual effort. Consequently society must not do anything to merge the individual in the mass, or weaken his own self-reliance. Whatever it does, through the state, for the aid of its weaker classes must be done indirectly—it must not weaken the recipients. State action, as Professor Bosanquet says, is justifiable only when it releases from some narrowing and restraining influence—when the instinct of a better life is struggling against some obstruction—and it is confined to the removal of such hindrances.*

To apply these principles more directly to the matter of economic conditions: we see that the state may properly

* *Philos. Theory of State*, p. 191.

act, indirectly, to relieve the condition of oppressed classes, in order to allow them to secure themselves a better life.

The causes of poverty are many and various. Professor Giddings has called attention to one of them, previously little noted. "There can be no social gain," he says, "that does not entail somewhere, on the whole community, or on a class, the break-up of long established relations, interests, and occupations, and the necessity of a more or less difficult readjustment. . . . The suffering that progress costs is borne for the most part vicariously. The classes who are displaced, whose interests and occupations are broken up by the relentless course of change, are not the ones who secure the joys of richer and ampler life. That which enormously benefits mankind is too often the irretrievable ruin of a few. . . . To some extent the numbers are recruited by victims of pure misfortune, whose undoing has been caused neither by their nature nor by their conduct."* So Professor Seth says it is for society to reckon up the costs of progress, and strive to maintain the equilibrium which progress seems continually to disturb.† In so far, then, as suffering is caused by the progress of society, the latter, through the state, is particularly justified in lessening it if it can.

Any suffering caused by poverty, however, may properly be relieved, whatever the cause of the poverty itself, provided it tends unduly to narrow the life of the citizens by the creation of permanent inequality of opportunity. Even on the ground of expediency this may be done, for poverty is cumulative in its effects, and no society thrives well if there is any class which is permanently far below the others.

The justification for state action on behalf of the lower classes becomes greater as society progresses. Complexity is characteristic of advanced civilizations; it involves intense specialization of function, sharp distinction of classes, and

* *Democracy and Empire*, p. 77.

† *Ethical Principles*, p. 306.

increasing divergence in economic condition. Complexity aids inequality of condition, and inequality of condition is cumulative. The extremes of economic condition always tend to become more widely separated, and the disadvantages of the lower levels to become greater and greater. Poverty is degrading—pauperizing: "the great enemy of the poor is their poverty." It is dangerous as well. "Poverty of itself does not make a pauper," says Hegel; "the pauper state implies a frame of mind, associated often with poverty, consisting in inner rebellion against the wealthy, against society, and against constituted authority."^{*} For its own protection and its own progress society may attempt to prevent the formation of such a class. Social well-being demands complete internal mobility—a continual sifting—and requires that any condition of stagnation be done away with. We have seen that this is equality in the proper sense.

State assistance to the distressed classes is of the same nature as the enforcements of contracts. Protection against the merciless, to whom economic inertia gives undue power, in the first case, is similar to protection against the unscrupulous in the second. It is of the same nature, again, as allowing bequests of property; an abstract principle is put aside to admit of a higher principle being followed—in the one case, the principle of the family, and in the other, the principle of the state itself, namely, better life.

The state, then, may properly give relief to such of its members as stand in need of it. For its own protection and progress it may oppose the creation of a class of mere workers,—citizens in name only, so far as the real life of society is concerned,[†]—and it is acting consistently with its own purpose in any attempt to better the life of its members. But all such action must be in the nature of removing conditions which are operating to prevent the realization of a good life in its citizens.

* "The Philosophy of Rights," Hegel; Dyde's Translation, § 244.

† See *Ethical Principles*, p. 306.

5.—What legislation is required to attain these ends?

Here it is possible to lay down only the most general principles. We may consider in how far the state ought to proceed along the path which we have seen it may properly take; we may inquire what ideal must be kept in view and what limitations must be regarded. But any exact announcement of the solution of the problem that has baffled social investigators for ages must be presumptuous in the extreme. "Ignorance alone has confidence enough to attempt that which is possible only to omniscience."^{*}

The proper aim of state action is not a bare equality, in the sense in which equality is usually understood. All that can be demanded in the name of equality, as we have seen, is that each shall be allowed to make as much of his life as he can—not that the state shall so arrange that each makes as much of himself as anyone else. The state may secure equality of opportunity; it cannot, and should not, secure equality of achievement.

It cannot, since inequality in ability is one of the most fundamental facts of human nature. As Robert Louis Stevenson quaintly puts it, we think of individuals now, not as "springing into life from God knows where, incalculable, untrammelled, abstract, equal to one another, but issuing modestly from a race, with virtues and vices, fortitudes and frailties, ready made; the slaves of their inheritance of blood; eternally unequal."[†] No human measures can bring about a dead level of equality among men who are "slaves of their inheritance of blood, eternally unequal." No government can prevent economic and social differentiation as long as human nature remains as it is—as long as men are unequal in powers, and tend to defer to their superiors, and demand freedom of action for themselves and others. If men should lose this desire of liberty, strict compulsion might produce economic equality; but without a fundamental change in human nature equality of condition is impossible.

^{*}Inequality and Progress; Preface.

[†]Essay on Gentlemen.

Nor should government strive for such equality of condition. The equality of men does not demand it; if each man is to be free to have the advantage of his own abilities, he must be willing to suffer the disadvantages of his own shortcomings; and to hold down the more able to the level of the less would be an intolerable violation of the principle. From the standpoint of the state, as well, such flat equality would be disastrous. "Inequality without liberty and fraternity is indeed an evil," says Professor Harris; "But essential equality would destroy personal freedom, and would leave as much fraternity as a man enjoys when he looks at himself in a mirror."* There can be no real social unity and no satisfactory life in a society of identical mediocres; there must be variety of situation and of function.

The welfare both of the individual and of society depends upon the presence of inequality. The individual must have full opportunity to make use of his own powers to better his condition; and society depends on inequality for progress. As we have seen, an advanced society is characterized by great diversity of function and condition; we may here notice that progress itself results from inequality, by means of continual sifting. Professor Giddings points out that social classes are always changing in membership.† Thus he says of those displaced by the readjustment consequent upon progress, that their personnel is continually changing, but that "the class, as a class, is endlessly renewed."‡ Men are continually dropping back into this class, and others are rising out of it; and the same process goes on in all the other classes. New leaders are ever pressing forward. The rich men of the present are recruited from the poor of a generation ago; the fortunes of that time are small when compared with those now amassed. Social progress does not result from the onward

* Inequality and Progress, p. 153.

† In Principles of Sociology.

‡ Democracy and Empire, p. 81.

movement of those in the lead, but from the continual advance of new leaders—in industry, in polities, in thought, in wealth,—to positions beyond those formerly marking the extreme front. It is essentially dependent upon equality of opportunity and inequality of achievement, and is entirely inconsistent with flat equality of position.

The state, then, should not strive to reduce men to a dead level of equality; to do so is to narrow their lives and put an end to progress. Its true aim is to bring about a real freedom of opportunity. But, as we have seen, mere economic freedom—freedom of competition—does not secure this, because of the inherent disadvantages of the poor in bargaining, and the cumulative effect of poverty. The state may properly act, then, to remove these disadvantages, so as to secure this freedom; in doing so, it must not attempt to secure any flat equality of position and must not weaken any of its citizens by giving direct aid. How may these conditions be met?

Such measures as the abolition of trusts, of the gold standard, of money, or of indirect taxation, and the adoption of the single tax on land values are merely partial remedies, in so far as they have any merits at all. They do not go to the root of the matter, and do not alter the essential conditions of industry. Whatever schemes may be adopted, whatever relief may be given, there is certain to be constant economic readjustment if private direction of industry and freedom of competition are retained. And in this readjustment the inefficient will continually drop behind, because their work is not worth having except at low wages. Where liberty is retained, inequality of capacity leads straight to inequality of condition.

Socialism, recognizing this, proposes to secure equality at the cost of liberty by turning all industry over to the state and ensuring a livelihood to all. Its ideal is a state in which all are well provided for, while having but little to do, the hours of labor being short; but it is entirely inadequate to bring this about. If all the wealth of the civilized

world were to be divided equally among the people of the various countries, there would be a scarcely appreciable betterment of the condition of the lower classes. Le Bon says that such a division in France of all incomes of more than £1000 a year would give each workingman an increase of four and a half per cent.* We note, too, that even the enormous income of a Rockefeller would give but a dollar per year additional to each resident of the United States. It should be obvious that a state in which hours of labor for all are short, and the great incentive of self-interest is lacking, would not be in better material circumstances than one under the present system. Socialism assumes an increase of wealth, while in no way making provision for greater production, unless, indeed we consider the employment of the men at present unemployed to be such provision. But here socialism assumes that all men are equal in capacity, and forgets that the great reason for men being out of work is that their work is not worth having at normal prices. We may be sure that instead of the wealth of the community increasing under socialism, freedom from personal responsibility and certainty of employment would result in wastefulness, indolence, and general poverty. Socialist schemes differ greatly, but all have government regulation of industry as a basic principle. Consequently any system of socialism would destroy personal responsibility, self-reliance, and individuality. Each system, too, aims to produce equality of condition, which we have already seen to be impracticable and disastrous. It may be noted incidentally that even equality of condition will not produce equality of satisfaction, since men differ widely in their desires and tastes; consequently even at its best (or worst) socialism does not succeed in bringing universal happiness.† There is more justice in our present system and more real contentment, for the man of finer organization, who has more discriminating tastes and higher ideals, has also, as a

* *The Psychology of Socialism*, Gustave Le Bon; p. 307.

† See *Democracy and Empire*, p. 120.

general thing, a greater ability to secure the wherewithal for their satisfaction. Socialism, then, is inadequate to accomplish its ends; and these ends are in themselves highly undesirable, since, as we have seen, they are subversive of the best life and fatal to progress. It aims to produce an undesirable condition by impracticable means.

Where liberty is retained, inequality is inevitable; where equality is enforced, progress ceases. Such is the dilemma with which all schemes to produce equality of condition are confronted. The truth is, of course, that bare equality is not to be sought for and that absolute rules for social improvement are impossible. Great inequality is fatal to stability, but some inequality there must be, to allow of progress; a progressive society is in a state of moving equilibrium, and can never be reduced to any fixed condition without disaster. Conditions are always changing and legislation must change with them; no final solution of the problem is possible. We can only say that the equilibrium must be maintained between equality and liberty, in such a way as to prevent fixity and give the best chance to each to adjust his condition to his merit. Certain general methods may be adopted to compensate for the disproportionate inequality of reward which we have seen threatens to reduce poverty to a status.

The effect of competition may be lessened and the disadvantage of the poor in bargaining overcome, not by interference in individual bargains, but by a general lightening of the burden of the lower classes. The employe is to be aided, but not at the expense of the individual employer. In the first place, legislation against unfair bargaining may be found practicable and necessary—such things as "company store," for instance, may be prohibited, and general relief may be granted by the establishment of courts for the adjustment of disputes between employers and employees. In the second place, taxation may be adjusted to overcome somewhat the disadvantages of the poor. The more general exemption of small amounts of property from taxation (and

from attachment) would prevent the total loss of economic recuperative power; the progressive taxation of incomes would compensate in some measure for the disproportionate advantage of capital. Such assistance, although indirect and so not tending to weaken the individual as direct aid would, must nevertheless be given very carefully: indolence must not be promoted, nor the industrious deterred from activity. No limit can be definitely assigned; here as always, the circumstances must govern and there must be "*bona fides*."

A more fundamental method of relief seeks to raise the standard of the lower classes. It recognizes that the surest way to secure more for the laborer is to make him worth more, and that any lightening of the burden of the poor only makes it possible for wages to be still further forced down. So it advocates the establishment of schools (especially of a technical nature), and libraries, to increase the workingman's ability, and the formation of trade and district clubs, coöperation, and local management in minor political matters, as a means of increasing his self-reliance and initiative, the lack of which has been the chief cause of his "*degradation*." Herein lies the function of trade-unions as a means for developing trade spirit, knowledge, and "*esprit du corps*." It is in this, too, that coöperation offers great advantages; it makes the men in some degree employers, with the responsibilities and opportunities which employers have. The same is true of profit-sharing, when it is in some way combined with a sharing of the risk of loss.

These are offered as mere suggestions of the general methods which may be followed. No final solution can be outlined, since the relations of various classes are continually changing and legislation must accommodate itself accordingly. Whatever means are adopted, a society must always see that they are not carried to excess. Good faith and intelligence are necessary in the use of any but rule of thumb methods: and no rule of thumb is applicable to a living, growing thing such as a society.

Nor can any legislation alone, however wisely conceived and executed, bring complete social contentment. Laws are but empty forms unless the spirit of the society is in them and behind them. There will always be a "submerged" class, as long as there are "cheap men" who are content to be less than they might—to work cheaply and live cheaply, in preference to living well at the cost of working hard;* here again the trade-union has a great opportunity to improve the laborer's conditions by arousing a proper *esprit du corps*. Such men, and others, will always be ready to take advantage of legislative enactments unfairly. And since economic injustice results not from the provisions of the statutes, but from the existence of unscrupulous and merciless individuals ready to take advantage of the inevitable shortcomings of laws and of the laxness of the public in regard to their enforcement, it will continue as long as they remain. The ultimate remedy for the cheap man who drags others down with him, and for the unscrupulous man who pushes others under him, is not to be found in laws, but in the growth of a better social sense and a stronger feeling of fellowship. Only a full realization that society is a community which exists to improve life, and that men are bound together in it, can remedy social conditions.

We have seen, then, that the assertions in the Declaration of Independence are substantially true, if properly understood, although as ordinarily taken they are abstract and meaningless. Rights, we have found, are individual claims which others by their very nature are bound to recognize, and the only inalienable right is the right to be considered independently of accidental distinction, as for instance, of hereditary privilege. This is the only equality—equality of opportunity to show oneself unequal to others, and to obtain a position equal to one's ability. Thus perfect economic mobility is implied, and anything in the nature of a fixed status must be done away with. Govern-

* See *Economics*, A. T. Hadley, § 360.

ments, as the organization of social power, may properly direct efforts to this end, since it is involved in the purpose of society—a better life for its members—and is necessary for its own preservation and progress. But in so doing they must aid only indirectly, by removing whatever hindrances may have been present. Certain general methods of doing so have been suggested, and it has been seen that legislation must vary according to the conditions of each time, the effort being to maintain a constant moving equilibrium between the two factors of equality and inequality, between the two ideals of stability and progress; and that such legislation can only succeed when it is backed by a sound public opinion—a thorough sense of justice and fellowship. For economic and social equality depend upon facts of human nature far beyond the reach of legislation: it is only as man becomes more social that society can become more humane.

COMMENCEMENT WEEK.

Commencement week of 1900 opened with the Class Exercises on Thursday, May 9. After a concert on the lower campus the senior oak was dedicated, addresses being made by J. W. S. Butler and Paul Sinsheimer of the graduating class and Fred M. Allen of the class of 1902. The pilgrimage to the different buildings followed and brief addresses were made by the following speakers: South Hall, Professor LeConte and Ralph Talcott Fisher; North Hall, Muriel Eastman and Milton H. Schwartz; Philosophy Building, Alexander Gordenker; Mining Building, William Beaumont Schaw; Chemistry Building, Glenn L. Allen; Library, President Wheeler and Richard Walton Tully. In the afternoon the spectacular extravaganza "The Annual Pilgrimage to the Shrine of the Most Learned Dragon Faculty" was given in the Class Day amphitheatre. In the evening the Librarian and his staff received the graduating class in the Bacon Art and Library Building. The artistic and bibliographical treasures were on exhibition and brief addresses were made by members of the class and by the President of the Alumni Association.

On Friday evening the Commencement Ball was held in Hearst Hall.

Saturday evening the men of the graduating class banqueted in San Francisco.

On Sunday afternoon at four o'clock, in Hearst Hall, Professor Thomas Rutherford Bacon preached the baccalaureate sermon, taking as his text James 1:27.

On Monday morning meetings of the Graduate Council, the Academic Council, and the Academic Faculties were

held in the Philosophy Building for the purpose of recommending to the Regents for degrees those who had satisfactorily completed courses in the Academic departments. Two candidates for the degree of Ph.D. were recommended; eight for the degree of A.M.; three for the degree of M.L.; five for the degree of M.S.; forty-eight for the degree of A.B.; one hundred and twenty-one for the degree of B.L.; one for the degree of Ph.B.; and sixty-three for the degree of B.S. The Academic Faculties elected the following as Deans for the academic year 1901-02: College of Letters, Professor Lange; Social Sciences, Professor Stringham; Natural Sciences, Professor Slate; Commerce, Professor Page; Agriculture, Professor Hilgard; Mechanics, Professor Cory; Mining, Professor Christy; Civil Engineering, Professor Soulé; and Chemistry, Professor O'Neill.

Mrs. Hearst during the afternoon entertained the graduating class at a garden party at her country residence, Hacienda del Pozo de Verona. In the evening the Philosophical Union held its last meeting for the year. Dr. W. P. Montague read a paper on The Bearing of Evolution on the Immortality of the Soul, and Professor Howison summed up the year's work in a Review and Criticism of Mr. Fiske's Argument in *Through Nature to God*.

On the morning of Tuesday the alumni of the Dental Department held a clinic in the Dental Infirmary, in San Francisco; in the afternoon they held a meeting of their Alumni Association; and in the evening the alumni and graduating class of the Dental Department banqueted at the Palace Hotel. The same evening the Faculty and alumni of the College of Pharmacy tendered a banquet to the graduating class, and the Academic Alumni held their annual reception at the Mark Hopkins Institute of Art.

The Regents of the University met in Berkeley on Tuesday afternoon and voted degrees to those recommended by the Faculties. On motion of President Wheeler it was also voted to confer the honorary degree of Doctor of Laws

on William McKinley, President of the United States. On the same afternoon the annual public meeting of the Phi Beta Kappa Society was held in Hearst Hall, Professor Joseph LeConte delivering an address on The Relation of Art and Science.

The thirty-second Commencement of the University of California was held on the morning of Wednesday, May 15, 1901. In anticipation of the presence of the President of the United States extensive preparations had been made and the greater part of the athletic grounds covered with seats and a platform for the distinguished guests, the Regents and Faculties, and the graduating classes. Between nine and ten thousand persons were accommodated. After the invocation by the Right Reverend Wm. F. Nichols, Protestant Episcopal Bishop of California, the following members of the graduating classes made brief addresses: Everett John Brown, Ph.B. (Hastings College of the Law), The Law School Graduate—His Training and Opportunity; Nathan Montgomery Moran (College of Letters), Democracy in Education; Ralph Talcott Fisher (College of Letters), The Unification of University Ideals; and William Buckhout Greeley (College of Social Sciences), The Historical Spirit in Practical Politics.

Governor Henry T. Gage then presented the Secretary of State, John Hay, who conveyed a message of regret from President McKinley, who was unable to be present owing to the serious illness of Mrs. McKinley, and briefly expressed the appreciation of the Presidential party of the welcome they had received in California.

The following were then commissioned by Governor Gage:—To be First Lieutenants—Donald Thompson Baker, Johann Friederich Erdmann Clewe, Frank Evans Howard, Otto Paul Rathke, Courtney L. Barham, Franklin Underwood Bugbee, Warren Vincent Richardson, Walter Nettleton Frikstad, Laurence Lincoln Greene, Carl Schilling, Frank Lennen Mulgrew; to be Captains—Richard Warren Harvey, Benton Alvin Hammond, Frank George Goodenow, John Winchel Spencer Butler, Carl Laurence Carlson, Walter Wadsworth Bradley, James Orland Osborn, Samuel Centennial Faneuf, John Emanuel

Gustafson, Edgar William Alexander, William Buckhout Greeley, Ralph Hamilton Curtiss, Henry Clinton Melone, Eugene Wellington Roland, Elry Jay Wagon, Cornelius George Dall, Walter Everett Conlin, Jack Dietrich Hoffman; to be Majors—Ralph Talcott Fisher, Nathan Montgomery Moran, Glenn Loring Allen; to be Lieutenant-Colonel—Walter Burling Bakewell; to be Colonel—Charles William McConaughy.

The following degrees were then conferred:

The Degree of Bachelor of Science (College of Chemistry) upon:—Edgar William Alexander, Glenn Loring Allen, Coniah Leigh Bigelow, Harvey Monroe Hall, Richard Warren Harvey, Frederick Laist, *George Walter Monroe, Anna Morgan, Carl Schilling, Florence Margaret Scott, Hiram Franklin Sheldon.

The Degree of Bachelor of Science (College of Civil Engineering) upon:—J. Shirley Bright, Walter Nettleton Frickestad, Adolph Judell.

The Degree of Bachelor of Science (College of Mining) upon:—Harry Winter Bangle, Edwin Lawrence Beck, Walter Wadsworth Bradley, *Ralph Stuart Browne, Harry Louis Cornish, Ivan DeLashmutt, Carlton Parker Griffin, Melvin Scribner Griffiths, Jack Dietrich Hoffmann, Lee Sylvester Kerfoot, Edwin Ralph Leach, *Aloysius Paul Mallon, Henry Daggett Morse, Horace Lankton Moulthrop, Arthur Charles Nahl, *Vance Craigmiles Osmont, Warren Vincent Richardson, William Beaumont Schaw, Paul Selby, Howard Dunbar Smith, Richard Charles Specht, Elry Jay Wagon, Otto Charles Zinns.

The Degree of Bachelor of Science (College of Mechanics) upon:—Harley Sargent Britt, Oscar Frederick Kern, Frank Walter Kerns, Paul Lebenbaum, Claude Wilson Place, *Kurt Schluss, Charles Robert Sessions, Walter Samuel Sessions, John Stanislaus Soares, Taichi Tanabe, Edward George Thunen, Edward Ingram Titlow.

The Degree of Bachelor of Science (College of Agriculture) upon:—Julia Rosele Pearce, B.S., Mooshegh Vaygouny.

The Degree of Bachelor of Science (College of Commerce) upon:—Benton Alvin Hammond.

The Degree of Bachelor of Science (College of Natural Sciences) upon:—*Helen Louise Emilie Arents, Minnie Beatrice Bannon, May Alice Bowcher, *Paul Castelhun, Ralph Hamilton Curtiss, *Leo Eloesser, Jr., Margaret Maria Fee, Margaret Fortier, Joseph LeConte Goldsmith, Hepzibiah Elizabeth Green, Elias Marcus Hecht, Rachel Kurlandzik, Benjamin Overfield Lacey, Elisabeth Henrietta Lehr, Genevieve Savage Manchester, *Samuel Philip Maybach, *Marion Michener, Evelyn Marianne Ratcliff, Otto Paul Rathke, Lionel Samuel Schmitt, Mary Winifred Tyrrell.

* Degree conferred December 27, 1900.

The Degree of Bachelor of Philosophy (College of Social Sciences) upon:—*Joseph Everett Brand, *Carl Sophus Hansen, *Franklin Porter Nutting, Margaretta Louise Thornton.

The Degree of Bachelor of Letters (College of Social Sciences) upon:—Jewel Alexander, Elizabeth Arlett, Florence Eunice Barnard, George R. Bartlett, Theobald Percy Bayer, *Robert Belcher, Ida Body, Jessie Bohall, *George Otto Brehm, Brownie Brownell, Thomas Fairchild Brownscombe, M.A., Ella May Bunnell, John Winchel Spencer Butler, Cora Belle Campbell, Carl Laurence Carlson, Ethel Beaver Catton, *Adrienne Cerf, Lillian Gertrude Chace, Antoinette Clemence Chevret, Helen Elizabeth Clapp, B.L., Amelia Ynez Coeke, Charles Matthew Coleman, Charles Maxwell Colton, Mary Sara Cooper, Edith Pearl Cox, Josephine Devine, Lou Irene DeYo, Edward Augustus Dickson, Margaret Elizabeth Doherty, Louis Fred Dreher, *Benjamin Franklin Driver, Boutwell Dunlap, Lillian May Durkee, Muriel Eastman, Elizabeth Eby, Guy Walton Eddy, Clarence William Edwards, Thomas Henry Emerson, Claribel Ensign, Edward Thomas Ford, Lilia Gertrude Forderer, Maude Malcolm Fraser, Agnes Frisius, Edith Edna Gaddis, Leland Isaac Gale, Leonora Gautier, Mabel Emma Gilson, Marcella Catherine Glazier, Isabel Blanchard Godin, Demetrius Alexander Gordenker, Elisabeth Goyne, Ruby Estelle Gracier, Ulrich Graff, May Bess Graham, May Ellenor A. Gray, William Buckhout Greeley, Laurenee Lincoln Greene, Marcella Gunning, *Karl Henrich, Margaret Frances Hill, Sophia Adelaide Hobe, Anne Lucia Holmes, Helen Lemoyne Hoose, Ph.B., Harriet Hoppin, Frank Evans Howard, Alice Orne Hunt, Hattie Handal Jacobs, May Belle Johnson, Clare Jones, Almira Jane Kelshaw, Edith Mabel Kendall, *Virginia Nason Klenck, Ph.B., Edith Rosine Kurtz, *Edward Gerhart Kuster, Katharine Maloy Layne, Elizabeth Eloise Ledgett, Harley Marion Leete, Hugh McCaskey Love, *Dolores Elenteria Machado, Harry Ellis Magee, George Peabody Manchester, Francis Freeman Marshall, Ethel Genevieve Marston, Martha Jane McDill, Edna May McKee, Lucius Dean McKinley, *Margaret McLeod, Nettie Meek, *Henry Clinton Melone, Vineenza Catherine Milledge, Mary Grace Miller, Florence Etta Montgomery, Ida Cornelia Moodey, Stanley Moore, Ruby Rose Morse, Edna Murdock, Charlotte Elizabeth Neale, Oney McCutchan Nicely, William Horsley Orrick, James Orland Osborn, Edna Tulloch Owen, Albert Wentworth Palmer, *Clelia Augusta Paroni, Gay Willis Parsons, Eva Powell, Maude Harriett Powell, Edward Augustus Powers, Caroline May Pulcifer, Ellen Kate Rea, Estelle Grace Roblin, Eugene Wellington Roland, Evangeline Sale, Milton Harry Schwartz, Elizabeth Mitchell Seupham, William James Shaw, Paul Ainsley Sinsheimer, Marion Cummings

*Degree conferred December 27, 1900.

Stanley, Jesse Henry Steinhart, Theresa Viola Stoer, Fanny May Strong, Amy Tabrett, *Olive Lord Taylor, Helena Pearl Thomas, Mabel Winifred Thomas, Margaret Troili, Richard Walton Tully, *Grace Abbie Tyrrell, Amy Gertrude Van Deerlin, Anna Frances White, Howard Collins White, Ellen Wilkinson, Mabel Lucinda Williams, Andrew McLellan Wolfenden.

The Degree of Bachelor of Arts (College of Letters) upon:—Hilda Abraham, Annie Harriet Allen, Lucile H. Bailey, Walter Burling Bakewell, James Clark Blair, Vivian Beatrice Bryan, Franklin Underwood Bugbee, Jessie Ellsworth Burnett, A.B., Blanche Maple Clark, Walter Everett Conlin, Cornelius George Dall, George Nelson Didion, Jeannette Ellison, A.B., Grace Emily Hazelton Fish, Ralph Talecott Fisher, *Alice Linscott Freese, Mary Theresa Gallagher, Frank George Goodenow, Arthur William Goodfellow, Eily Mahoney Grosjean, John Emanuel Gustafson, Fred Beckman Hart, Catharine Hirstel, Wesley Newcomb Hohfeld, Florence Edna Hoyt, Anita Giles Hubbard, Corinne Hutton, Martha Adelaide Ijams, Katherine Courtenay Johnston, *Myrtle Jeannette Joseph, Winthrop Lecicester Keep, Louise Kellogg, *Mabel Earle Kelsey, Elizabeth Keyser, *Thomas Drummond Mansfield, Helen Louise Martin, Stuart Galbraith Masters, *Margaret McCowan, A.B., Herbert Turbitt Moore, Nathan Montgomery Moran, Minna Helen Nelson, Emma Estella Parker, A.B., Clara Christine Piper, Florence Mabel Preble, Fannie May Sanborn, Mary Southern Shreve, Elizabeth Jackson Skinner, Irene Taylor, Edith Grace Thatcher, Lillian Claire Versalovich, Louise Hinckley Whitehead, *Flora Wilson, Miriam May Wollner, Alice Bowman Wright.

The Degree of Master of Science (College of Chemistry) upon:—George William Beattie, B.S., (Thesis: Nernst's Theory of the Concentration Cell); William Thompson Skilling, B.S., (Thesis: Thermal Values, and Chemical and Physical Properties of California Petroleum).

The Degree of Master of Science (College of Natural Sciences) upon:—Gulielma Ruth Crocker, A.B., (Thesis: Larval Development and Metamorphosis of *Astenas Equalis*); Katharine Matthews Crusoe, B.S., (Thesis: The Effect of the Surrounding Atmosphere on the Spark Spectra of some Metals); Arthur Scott King, B.S., (Thesis: The Effect of the Surrounding Atmosphere on the Arc Spectrum of Carbon); *Sanford Alexander Moss, B.S., (Thesis: Thermodynamics of the Gas Turbine).

The Degree of Master of Letters (College of Social Sciences) upon:—Adeline Belle Croyland, B.L., (Thesis: A Philological and Historical Study of "L'Histoire de Guillaume le Maréchal, regent d'Angleterre de 1216 à 1219: Poème Français du XIII^{me} Siècle");

* Degree conferred December 27, 1900.

Mabel Hall Jacobs, Ph.B., (Thesis: Lessing's Dramatic Principles and their Application to Typical Elizabethan Dramas); Fanny Eliza Snell, B.S. (Carleton College), (Thesis: The Didactic Element in Victorian Poetry).

The Degree of Master of Arts (College of Letters) upon:—Louise Crennell Callow, M.A. (Western Reserve University), (Thesis: Plato's Treatment of Poets); David Raymond Curtiss, A.B., (Thesis: On the Invariants of a Homogeneous Quadratic Differential Equation of the Second Order); Richard Lenox Halsey, A.B. (Princeton University), LL.B. (Columbia University), B.D. (Chicago University), (Thesis: Present Attitude of the Japanese toward their Native Religions); Lalla Fowler Harris, A.B., (Thesis: The Origin and Growth of Plato's Logic, by W. Lutoslawski); William Inch, A.B. (University of Southern California), (Thesis: The Relative Worth of the Manuscripts of Plato's Republic); Ivan Mortimer Linforth, A.B., (Thesis: The Adverb *Iam*: with Particular Reference to the Usage of Lueretius); Francis Robert Morrison, A.B., (Thesis: The Canons of Literary Criticism); Helen Wooster Peckham, A.B. (Vassar College), (Thesis: Pope Gregory VII).

The Degree of Doctor of Veterinary Science (Veterinary Department) upon:—George John Donnelly.

The Degree of Graduate in Pharmacy (California College of Pharmacy) upon:—Marquis de Lafayette Barrett, Harry Irving Blackman, John Marvin Booher, Arthur Brett Clapp, Philip Scott Clapp, William Henry Dunlap, Orin Eastland, Oscar Harrison Edinger, Fred Chester Englesby, John William Joseph Enright, Theodore Emmet Farrell, Francis Xavier Fleming, Clark Merrill Foote, John Henry Franklin, Gustave Adolph Griesche, Fayetta Harris, John Dante Illia, John Carpenter James, Charles Laux Kitzmeyer, Herman Kronenberg, Emile Theodore Lacoste, Elmer Baker Maze, Laura Alice McCord, Herbert Leslie McDonnell, Thomas Talbot McGuire, Edward McKinlay, Frederick William Nish, George McCamley Oswill, Waldemar Bruce Philip, Robert Courtland Ramage, Stanley Herbert Robbins, Albert Frank Sidney Schmidt, John Pitt Taggart, Jackson Temple, Jr., Thomas Dollard Trueworthy, Robert Greenleaf Whitlock, Maurice John Zimelli.

The Degree of Doctor of Dental Surgery (Dental Department) upon:—George Smythe Aiken, Domenico Antonio Alberti, Charles Stuart Ayres, Adolph Baer, B.L., B.S., Julius Baer, Thomas Ira Cook Barr, John Clifford Baxter, Edward Lee Betterton, Samuel Daniel Block, Ralph Ellis Burns, Joseph Anthony Carew, Jesse Chilton, George Samuel Conner, Archibald Younger Dick, James Severino Domeniconi, Martin Espinosa, Percy De Witt Gaskill, Harry Everett Gates, Maurice Louis Green, Adolph K. Harshall, Horace Noble

Henderson, Elwood Fairbairn Herbert, Oliver Joseph Howard, Anna Lee Hudgens, Walter Ernest Janke, Charles Henry Jurgens, Henry Burton Knox, Leo Valentine Levinger, Walter French Lillard, James Albert Lindsay, Edwin Henry Mauk, James McGough, John Fred Orville McMath, Guy Stillman Millberry, Joseph Franc Novitzky, Edward William O'Brien, Eugene DeShong Painter, Percy Stuart Regnart, Edward Jack Rinekel, Guy Rogers, Ralph Bartholomew Scheier, Frank William Seydel, William Shepard, Fred James Seifert, Frederick William Stapff, Henry Stuart Stern, John Lyons Sullivan, Anna Christina Frank Wagner, Chapman M. White, Jr., Jay Fremont Wilson, Roy Irving Woolsey.

The Degree of Doctor of Medicine (Medical Department) upon:—Edgar Allen Arthur, Wilfred Fenton Beerman, Ph.G., Kate Isabel Brady, A.B., Walter Murray Diekic, Ph.B., Ralph Orlando Dresser, John Nivison Force, B.S., Harold Phillips Hill, A.B., Reuben Chandler Hill, Mary Frances Kavanagh, Milton Byrne Lennon, M.A., John Vaughan Leonard, William Kinkade Lindsay, Rasmus Hansen Madsen, A.B., Florence McCoy, B.S., Frederic Lincoln Morong, William James Murphy, George Philip Purlenky, Ph.G., Fletcher Greene Sanborn, Lionel Samuel Schmitt, James Walter Seawell, Hadyn Mozart Simmons, Ph.G., Hudson Smythe, George William Sweetser, Ph.G., Benjamin Thomas, M.A., Joseph Michael Toner, John Lysander White, Chester Howard Woolsey, B.S., Una Yone Yanagisawa, B.L.

The Degree of Bachelor of Laws (Hastings College of the Law) upon:—Thomas Dickey Aitken, Phil Brent Arnold, Ph.B., James Hall Bishop, Thomas Porter Bishop, Ph.B., Hugh Barr Bradford, B.L., William Aloysius Breen, A.B., Everett John Brown, Ph.B., John Quiney Brown, Ph.B., Charles Marcellus Bufford, M.A., John James Callaghan, Charles Strother Chandler, A.B., Allen Lawrence Chickering, A.B., Herbert Eugene Clayburgh, Ph.B., Edward Ignatius Coffey, Samuel Milton Crim, Oliver Dibble, Ph.B., Marie Cecelia Dillon, John Wilson Douglass, Dennis Maxwell Duffy, A.B., William Ede, A.B., Perry Evans, B.L., George Franklin Gill, Alfred Ephraim Goldsten, Frank James Hennessy, A.B., Guy Hinton, M.A., Roy Gage Hudson, John Louis Armand Jaunet, A.B., Edwin McMurray, James Diven Meredith, Charles Louis Neumiller, Hartley Fiske Peart, B.L., Frank Edward Powers, Maggie Adelia Ross, B.S., Harry Francis Sullivan, Lawrence Talcott Wagner, A.B., George Erastus Weaver, William Joseph Weyand, Brooke Maynard Wright, Handel Hart Zobel.

The Degree of Doctor of Philosophy (College of Natural Sciences) upon:—Russell Tracy Crawford, B.S., (Thesis: Determination of the Constant of Refraction from Observations made with the Repsold

Meridian Circle of the Lick Observatory); Frank Elmore Ross, B.S., (Thesis: Differential Equations belonging to a Ternary Linearoid Group).

The names of the following undergraduate candidates for degrees to be conferred in 1900-01 were, by vote of the Academic Council, printed on the programme as worthy of honorable mention for distinguished scholarship:

Walter Wadsworth Bradley, College of Mining; Harley Sargent Britt, College of Mechanics; Vivian Beatrice Bryan, College of Letters (Latin, Greek); Ralph Hamilton Curtiss, College of Natural Sciences (Mathematics, Astronomy); Cornelius George Dall, College of Letters (Mathematics, Astronomy); Ulrich Graff, College of Social Sciences (German); William Buekhout Greeley, College of Social Sciences (History); Carlos Parker Griffin, College of Mining; Melvin Scribner Griffiths, College of Mining; Harvey Monroe Hall, College of Chemistry (Chemistry, Botany); Sophia Adelaide Hobé, College of Social Sciences (History); Wesley Newcomb Hohfeld, College of Letters (Philosophy, Jurisprudence); Martha Adelaide Ijams, College of Letters (Latin, French); Adolph Judell, College of Civil Engineering; Winthrop Leicester Keep, College of Letters (Latin, Greek); Benjamin Overfield Lacey, College of Natural Sciences (Mathematics, Physics); Frederick Laist, College of Chemistry (Chemistry); Harry Ellis Magee, College of Social Sciences (Jurisprudence); Genevieve Savage Manchester, College of Natural Sciences (Chemistry, Philosophy); Nathan Montgomery Moran, College of Letters (History, Philosophy); Evelyn Marianne Ratcliff, College of Natural Sciences (Mathematics, Physics); Hiram Franklin Sheldon, College of Chemistry (Chemistry, Mathematics); Jesse Henry Steinhart, College of Social Sciences (Jurisprudence); Irene Taylor, College of Letters (Greek, Latin); Mabel Winifred Thomas, College of Social Sciences (English, German); Andrew McLellan Wolfenden, College of Social Sciences (History, Jurisprudence).

The President announced that the University Medal, awarded annually to the most distinguished graduate of the year, had been awarded for 1901 to Wesley Newcomb Hohfeld, of the College of Letters.

The exercises concluded with the benediction by Bishop Nichols.

At 1 o'clock the Alumni luncheon was held in the Harmon Gymnasium. Rev. W. A. Brewer, '87, acted as toastmaster, and brief addresses were made by Governor Nash, of Ohio; C. S. Greene, '86, President of the Alumni

Association; Mrs. A. F. Morrison, '78, Hon. George W. Pierce, '75, Hon. Frederick Searls, '76, and M. H. Schwartz, '01.

With the farewell reception to the graduating class by President and Mrs. Wheeler in Hearst Hall, on Wednesday evening, the exercises of Commencement week came to a close.

CURRENT NOTES.

During the latter part of April and the early part of May six lectures on "Le Théâtre Contemporain" were delivered at the University by M. Gaston Deschamps, the eminent French scholar and author, who for the last eight years has been the literary critic of *Le Temps*. The titles of the lectures were: *Les Maîtres du Théâtre Contemporain*, *La Question du Mariage*, *La Vie de Famille*, *La Question Sociale*, *Le Drame Héroïque*, and *L'avenir du Théâtre en France*. M. Deschamps was the lecturer for 1901 of the Cercle Français of Harvard University, and his visit to Berkeley was made possible by the generosity of Messrs. James H. Hyde and C. B. Alexander of New York, and Mr. George Crocker and Prince Andre Poniatowski, of San Francisco.

The February number of the UNIVERSITY CHRONICLE contained an account of the first three University meetings of the term. The fourth was held on March 1, the speakers being Professor Elwood Mead, who explained the importance to California of the newly organized Department of Irrigation; Rev. Charles R. Brown, pastor of the First Congregational Church of Oakland, who spoke on "The Well Built Man;" and Dr. Martin, President of the Imperial University of Peking, who stated the educational needs of the Orient. At this meeting President Wheeler announced that Mrs. Phœbe Hearst had transferred

to the Regents Hearst Hall, its site, and its equipment, a gift valued at \$45,700.

At the meeting of March 15 the speakers were Mr. John G. Howard, who gave an account of the University buildings contemplated in the Phœbe Hearst Architectural Plan; and Rev. Dr. Clampett, who gave reminiscences of student life at the University of Dublin. Mr. James H. Eckles, Comptroller of the Currency under President Cleveland, and Mr. Frank J. Symmes, President of the Thomas Day Company of San Francisco, addressed the students at the meeting of March 29, the former on "The Value of Reforms," the latter on "Hints from Practical Life."

The speaker at the seventh meeting, April 12, was Rev. Dr. Wm. J. Tucker, President of Dartmouth College, who expressed himself in favor of the elective system and early specialization. The final meeting of the term was held on April 19, and was planned as an occasion for the expression of college life. Brief talks were given by members of the student body on the topic "What can I do for my University?"

The summer session for 1901 will begin on June 27 and end on August 7. Courses will be offered at Berkeley by the following departments: Philosophy (one course), Education (five courses), History and Political Science (ten courses), Semitic (one course), Greek (two courses), Latin (three courses), English (seven courses), Mathematics (three courses), Physics (five courses), Astronomy (one course), Chemistry (five courses), Botany (three courses), Mineralogy (two courses), Agriculture, Horticulture, and Irrigation (twelve courses), and Physical Culture (five courses).

In addition to thirty-three members of the Faculties of the University of California, instruction will be given by John Dewey, Professor of Philosophy in the University of Chicago; James E. Russell, Dean of the Teachers' College of Columbia University; E. P. Cubberley, Associate Pro-

fessor of Education in Leland Stanford Junior University; H. Morse Stephens, Professor of Modern History in Cornell University; Barrett Wendell, Professor of English in Harvard University; Ewald Flügel, Professor of English Philology in Leland Stanford Junior University; Carlos Bransby, Instructor in Spanish in the Los Angeles High School; L. H. Bailey, Professor of General and Experimental Horticulture in Cornell University; and James M. Wilson, Irrigation Expert, United States Department of Agriculture.

Concurrently marine biological survey work will be prosecuted on the coast of Southern California by the Zoölogical Department of the University, the headquarters for the operations being at San Pedro. In connection with the work of exploration and investigation courses of instruction will be given by Professor Ritter, Professor Kofoid, and Dr. Bancroft. These investigations are made possible, financially, by coöperation with the University of Messrs. H. W. O'Melveny, J. A. Graves, Jacob Baruch, Wm. G. Kerckhoff, Wm. R. Rowland, J. H. Shankland, John E. Plater, the Los Angeles Terminal Railway, and the Banning Company, all of Los Angeles.

